Beyond negative emotions: Examining the role of positive emotions in non-suicidal self-injury

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Abstract

According to the broaden-and-build theory (Fredrickson, 1998, 2001), negative emotions restrict individuals' thoughts and actions. Contrarily, the experience of positive emotions broadens an individual's repertoire of thoughts and actions, which has the ability to reduce the impact of negative emotions in the short-term (Tugade & Fredrickson, 2004, 2007). However, despite the important role that positive emotions are thought to play in emotion regulation, scholars have yet to look beyond the dysregulation of negative emotion and develop an understanding of the regulation of positive emotions in individuals who engage in NSSI. Accordingly, the primary goal of this dissertation is to re-conceptualize how emotion dysregulation is studied within the field of NSSI through the investigation of positive emotions.

The first manuscript examines the role of negative and positive emotional reactivity in 96 female university students who reported engaging in NSSI within the past two years (*Mage* = 20.28 years; *SD* = 1.65) and an age-matched female no-NSSI comparison group (*Mage* = 20.43 years; *SD* = 1.76). Females with a history of NSSI reported higher negative emotional reactivity across all facets (emotional intensity, sensitivity, and persistence) compared to females without a history of the behaviour. Additionally, the persistence of negative emotions was found to be the only significant predictor of NSSI engagement. On the other hand, no differences were found between the two groups in relation to positive emotional reactivity. The second manuscript investigates the role of emotional dysregulation of negative and positive emotions in individuals with and without a history of NSSI. Participants included 95 female university students who reported engaging in NSSI over the past two years (*Mage* =

20.27; *SD* = 1.65) as well as 95 female university students without a history of NSSI engagement (*Mage* = 20.43; *SD* = 1.77). Results indicated that individuals with a history of NSSI reported significantly more difficulties regulating their negative and positive emotions than those who have not engaged in NSSI. Furthermore, while both groups displayed similar patterns of strategy use across a range of positive and negative emotions, a higher number of unhealthy strategies were selected for situations involving negative emotions. Participants across groups (NSSI and no-NSSI) were found to use more healthy strategies in positive valence situations than unhealthy strategies; however, those with a history of NSSI to a lesser degree than their non-NSSI counterparts. The third manuscript extends these findings by comparing overall group responses on questionnaires that target general tendencies in negative and positive emotional reactivity and regulation, as well as responses following a standardized in-person mood induction. The sample consisted of 36 females (*Mage* = 20.06; *SD* = 1.51) with a history of NSSI within the last two years and a no-NSSI female comparison group (*n* = 34; *Mage* = 20.15; *SD* = 1.54). The results indicated that individuals with a history of NSSI reported significantly greater difficulties than those without NSSI in negative emotional reactivity and regulation on the self-report questionnaires. On the other hand, no group differences were found for positive emotional reactivity and regulation. Furthermore, participants' responses to the mood inducement task revealed no group differences in reactivity or regulation for either negative or positive emotions.

Consistent with previous research, individuals' negative emotional reactivity and regulation play an important role in NSSI. Nonetheless, the importance that the broaden-and-build theory places on positive emotions has the potential to deepen our

understanding of the underlying processes involved in NSSI. Notably, for the regulation but not the reactivity, of positive emotions. Directions for continued research on emotion regulation from a broaden-and-build theory perspective, as well as practical implications for mental health professionals, are discussed.

Keywords: non-suicidal self-injury, emotion dysregulation, emotional reactivity, negative emotions, positive emotions

Résumé

Selon la théorie *broaden-and-build* (élargissement et construction) (Fredrickson, 1998, 2001), les émotions négatives limitent les pensées et les actions, contrairement; l'expérience des émotions positives élargit le répertoire de pensées et d'actions d'un individu, ce qui a la capacité de réduire l'impact des émotions négatives à court terme (Tugade et Fredrickson, 2004, 2007). Cependant, bien que la théorie de *l'élargissement et de la construction* (Fredrickson, 1998, 2001) place sur le rôle des émotions positives auprès de la régulation des émotions, les chercheurs n'ont pas encore recherché au-delà de la dérégulation des émotions négatives pour développer une meilleure compréhension de la régulation des émotions chez les individus qui s'automutilent. En conséquence, l'objectif principal de cette thèse est d'élargir la conceptualisation de la dysrégulation des émotions dans le domaine de l'automutilation non suicidaire (AMNS) en intégrant les émotions positives.

Le premier manuscrit examine le rôle de la réactivité émotionnelle négative et positive chez 96 étudiantes qui s'étant déjà automutilée au cours des deux dernières années (*Mâge* = 20,28 ans; *ÉT* = 1,65) et un groupe témoin non-AMNS (*Mâge* = 20,43 années, *ÉT* = 1,76). Les femmes ayant des antécédents d'AMNS ont signalé une réactivité négative plus élevée dans tous les aspects (intensité émotionnelle, sensibilité et persistance) comparativement aux femmes n'ayant pas les mêmes antécédents de comportement. De plus, la persistance des émotions négatives était le seul prédicteur significatif de l'AMNS. Aucune différence n'a été trouvée entre les deux groupes en ce qui concerne les émotions positives. Le deuxième manuscrit étudie le rôle de la dérégulation émotionnelle des émotions positives et négatives chez les personnes avec ou

sans antécédents d'AMNS. Les participants comprenaient 95 étudiantes universitaires ayant déclaré avoir eu un comportement d'automutilation non suicidaire au cours des deux dernières années (*Mâge* = 20,27, *ÉTæ* = 1,65) ainsi que 95 étudiantes universitaires sans antécédents d'engagement NSSI (*Mâge* = 20,43; *ÉT*= 1,77). Les résultats ont indiqué que les personnes atteintes d'automutilation non suicidaire ont signalé beaucoup plus de difficultés à réguler leurs émotions positives et négatives que celles qui n'ont pas un historique récent de l'ANMS. De plus, bien que les deux groupes aient présenté des schémas similaires en ce qui concerne l'utilisation des stratégies à travers les émotions, un plus grand nombre de stratégies inadaptées ont été sélectionnées pour des situations impliquant des émotions négatives. Les individus avec et sans AMNS ont été trouvés d'utiliser davantage de stratégies plus adaptatives lors des situations de valence positive; cependant, celles qui se sont déjà automutilées se trouvent dans une moindre mesure que leurs homologues non-AMNS. Le troisième manuscrit étend nos résultats en comparant les réponses des participants à des questionnaires qui ciblent les tendances générales de la réactivité émotionnelle et la régulation positive et négative avec les réponses des participants à la suite d'une induction d'humeur standardisée en personne. L'échantillon comprenait 36 femmes (*Mâge* = 20,06, *ÉT* = 1,51) ayant des antécédents d'AMNS au cours des deux dernières années et un groupe de comparaison de femmes non-AMNS (*n* = 34, *Mâge* = 20,15, *ÉT* = 1,54). Les résultats ont indiqué que les individus ayant des antécédents d'AMNS ont signalé des difficultés significativement plus grandes dans la réactivité émotionnelle négative et la régulation lors des questionnaires d'auto-évaluation. D'autre part, aucune différence de groupe n'a été trouvée pour la réactivité émotionnelle et la régulation des émotions positives. De plus, les réponses des participants à la tâche

d’induction de l'humeur n'ont révélé aucune différence de réactivité ni de régulation entre les émotions positives et négatives.

Compatible à la recherche antérieure, la réactivité émotionnelle et la régulation négative des individus jouent un rôle important dans la compréhension de l'AMNS. Néanmoins, les principes de la théorie de *l'élargissement et de la construction* élargissent notre connaissance des processus sous-jacents impliqués dans l’AMNS. Notamment, pour la régulation des émotions positives, mais pas pour la réactivité de telles émotions. Des directions pour la poursuite de la recherche sur la régulation des émotions impliquant la perspective de la théorie *élargie et de construction*, ainsi que des implications pratiques pour les professionnels de la santé mentale, sont discutées.

Mots-clés: automutilation non suicidaire, dysrégulation émotionnel, réactivité émotionnelle, émotions négatives, émotions positives

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Statement of Authorship

The projects described in this dissertation were first authored by myself and co-authored in various capacities by Dr. Nancy Heath and Ms. Jessica Mettler. I was the originator of all concepts, research questions, and overarching conceptual framework for all three studies in consultation with Dr. Heath. With respect to the three manuscripts, I was responsible for data collection, along with the aid of my research assistants. I was also responsible for writing the three manuscripts. In addition, Dr. Nancy Heath and Jessica Mettler advised me throughout the data analyses and write up of the results. Co-authorship on this thesis is in accordance with McGill's Graduate and Postdoctoral Studies Thesis Guidelines.

Table of Contents

Abstract II

Résumé V

Acknowledgements VIII

Statement of Authorship IX

Table of Contents X

List of Tables and Figures XII

List of Appendices XIV

Introduction 15

CHAPTER 1 19

- Non-Suicidal Self-Injury 19
- Theoretical Framework 22
- Emotion Regulation 23
- NSSI and Emotions 27
- Current Limitations 34
- Principal Aims of the Research Program 35

CHAPTER 2. MANUSCRIPT 1 38
Negative and Positive Emotional Reactivity in Females With and Without a History of Self-Injury

- Abstract 39
- Method 46
- Results 50
- Discussion 53
- Conclusion 57
- References 58

Bridging Manuscripts 68

CHAPTER 3. MANUSCRIPT 2 71
Emotion Dysregulation and Non-Suicidal Self-Injury: An Investigation of Negative and Positive Emotions

Abstract 72

Method 79

Results 83

Discussion 85

Conclusion 91

References 94

Bridging Manuscripts 110

CHAPTER 4. MANUSCRIPT 3 112
Emotional Reactivity, Emotional Regulation, and NSSI: Is it Accurately Perceived?

Abstract 113

Method 114

Results 127

Discussion 130

Conclusion 134

References 135

CHAPTER 5. Discussion 149

Summary of Findings and Original Contributions to Knowledge 149

Directions for Future Research 152

Clinical Implications 154

Implications for School Psychologists 155

Concluding Comments 156

Bibliography 157

List of Tables and Figures

Manuscript 1

Table 1. Means and Standard Deviations of Aspects of Negative and Positive Emotional Reactivity 66

Table 2. Logistic Regression Predicting Likelihood of NSSI Engagement in the Past Two Years Based on Aspects of Negative Emotional Reactivity 67

Table 3. Percentage of participants endorsing self-injury by method.....68

Manuscript 2

Table 1. Means and Standard Deviations for Emotion Regulation scores of Negative and Positive Emotions for Participants With and Without a History of NSSI Engagement ..105

Table 2. Frequency of Healthy and Unhealthy Coping Strategy Use for Negative and Positive Emotions in Both NSSI and Non-NSSI Groups and Pairwise Comparisons Across Emotions 106

Table 3. Results from Chi Square Tests Comparing Healthy and Unhealthy Strategy Use Across NSSI and Non-NSSI Groups Within Positive and Negative Emotions.....107

Figure 1. Patterns of Significant and Non-Significant Differences When Comparing Unhealthy Strategy Use Across Different Emotions 108

Figure 2a. Frequency of Use of Healthy Strategies for Negative and Positive Emotions for Individuals With and Without a History of NSSI 109

Figure 2b. Frequency of Use of Unhealthy Strategies for Negative and Positive Emotions for Individuals With and Without a History of NSSI 109

Manuscript 3

Table 1. Means and Standard Deviations for Negative and Positive Emotional Reactivity and Regulation 145

Table 2. Results of 2 (Group: NSSI vs. non-NSSI) X 4 (Time: pre, post, 1 minute post, 2 minutes post) Repeated Measures ANOVAs for Negative and Positive Affect Following a Negative and Positive Mood Inducement 146

Table 3. Results of Pairwise Comparisons of Time for 2 (Group: NSSI vs. non-NSSI) X 4 (Time: pre, post, 1 minute post, 2 minutes post) Repeated Measures ANOVAs for Negative and Positive Affect Following a Negative and Positive Mood Inducement 147

Figure 1a. Mean Negative (NA) and Positive (PA) Affect Acores for Women With and Without a History of NSSI Pre and Post the Positive Mood Inducement 148

Figure 1b. Mean Negative (NA) and Positive (PA) Affect Acores for Women With and Without a History of NSSI Pre and Post the Negative Mood Inducement 148

List of Appendices

APPENDIX A: Stress and Coping Questionnaire (Manuscript 1, 2, 3) 184

APPENDIX B: The Inventory of Statements About Self-Injury (Manuscript 1, 2, 3)....188

APPENDIX C: Emotion Reactivity Scale (Manuscript 1,3) 190

APPENDIX D: Positive and Negative Affect Scale (Manuscript 3).....192

APPENDIX E: Regulatory Emotional Self-Efficacy scale (Manuscript 2, 3).....193

APPENDIX F: Emotional Regulation Profile-Revised (Manuscript 2) 194

APPENDIX G: Mood Induction Experiment Script (Manuscript 3).....211

APPENDIX H: McGill Classified Advertisement 213

APPENDIX I: Email to Participants for Participants in Online Study (for previous participants) 214

APPENDIX J: Consent Form for Online Study (for classified recruitment).....214

APPENDIX K: Consent Form for Online Study 216

APPENDIX L: Debriefing Sheet.....217

APPENDIX M: Email for Emotional Inducement Study.....218

APPENDIX N: Consent Form for Emotional Experiences Study.....219

Introduction

Non-suicidal self-injury (NSSI) is a highly prevalent behaviour that typically emerges in adolescence and is associated with an increased risk of suicide (e.g., Andover, Morris, Wren, & Bruzzese, 2012; Muehlenkamp & Gutierrez, 2007; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006) and mental health problems (e.g., Howe-Martin, Murrell, & Guarnaccia, 2012; Muehlenkamp & Gutierrez, 2007; Nock et al., 2006). Individuals engage in NSSI for several reasons including affect regulation (e.g., to release emotional pressure that builds up inside of oneself), self-punishment (e.g., to express anger at one's self), anti-dissociation (e.g., to increase feelings of being connected in reality), and interpersonal motives (e.g., to let others know what they are going through). Given the high prevalence of this behaviour and the seriousness of its corelates, researchers have rigorously investigated the function of NSSI (e.g., Klonsky, 2007, 2009; Nock, 2009), concluding that the majority of individuals engage in NSSI to reduce their experience of negative affect. To date, most of the existing literature has focused on investigating the role of negative emotions in the development and maintenance of NSSI (e.g., Adrian, Zeman, Erdley, Lisa, & Sim, 2011; Chapman, Gratz, & Brown, 2006; Gratz & Roemer, 2008; Jenkins & Schmitz, 2012). In fact, it has been found that individuals who engage in NSSI have higher levels of emotional reactivity (e.g., Gratz & Roemer, 2004; Jenkins & Schmitz, 2012; Nock, Wedig, Holmberg, & Hooley, 2008) and have increased difficulty in attending to and identifying their emotions (e.g., Gratz & Roemer, 2008; Heath, Toste, Nedecheva, & Charlebois, 2008; Skidmore, 2013; Turner, Chapman, & Layden, 2012). Furthermore, researchers have concluded that individuals who use NSSI for affect regulation purposes do so in order to reduce their experiences of negative emotions (e.g., Andrews, Martin, Hasking, & Page, 2013; Gratz & Roemer, 2008; Hasking, Coric, Swannell, Martin, Thompson, & Frost, 2010;

Heath et al., 2008; Turner et al., 2012; Williams & Hasking, 2010). Nonetheless, the particular strategies employed to reduce negative affect, which include rumination and suppression of emotions (Andrews et al., 2013; Hasking et al., 2008; Turner et al., 2012), have not been found to be effective in achieving this goal (Chapman, Brown, & Gratz, 2006). Consequently, negative emotions have been the primary focus of researchers in this area. However, the broaden-and-build theory of positive emotions (Fredrickson, 1998, 2001) provides a new lens for NSSI research, whereby it posits that positive emotions play a larger role in emotion regulation than do negative emotions. Specifically, Frederick (1998, 2001) proposes that positive emotions have the ability to broaden an individual's repertoire of thoughts and actions and also have the ability to reduce the impact of negative emotions in the short-term (Fredrickson, 1998, 2001; Tugade & Frederickson, 2004, 2007). Accordingly, the manner in which individuals who have a history of engaging in NSSI react and cope with their positive emotions merits investigation.

Proposed Research

Researchers have exhaustively investigated how individuals who engage in NSSI have significant difficulties downregulating their negative emotions through the use of healthy emotion regulation strategies. These individuals have consequently chosen to use unhealthy strategies, such as rumination and suppression of emotions, in order to regulate their emotions. Some research has been done looking at the frequency of positive emotions in individuals who engage in NSSI. For example, Klonsky and Victor (2014) have shown that individuals who engage in NSSI experience lower levels of positive emotions than those who do not engage in this behaviour. However, the role that positive emotions play in the dysregulation of these individuals has not been fully elucidated. Thus, the overall objective of this program of research is to extend the current understanding of emotion regulation and reactivity, and thus see whether

such mechanisms work similarly or differently in negative and positive emotions as well as between individuals with and without a history of NSSI. Specifically, the first objective of this project is to investigate the nature of reactivity of negative and positive emotions among young female adults who engage in NSSI in comparison to a non-NSSI control group. The second objective is to examine the perceived dysgregulation of negative and positive emotions among young female adults who engage in NSSI, compared to those who do not have a history of engaging in NSSI, as well as the strategies (healthy vs. unhealthy) employed to regulate such emotions. The third objective of this study is to empirically investigate the manner in which young female adults who engage in NSSI experience and recover from negative and positive moods compared to a non-NSSI control group through a mood induction. For each of the groups (NSSI and non-NSSI), the results from the mood induction will then be compared to participants' self-report of their overall tendencies related to emotional reactivity and regulation. In sum, this program of research will assist in furthering the current understanding regarding the manner in which emotions are experienced in young adults who engage in NSSI.

The three related manuscripts are presented in Chapters 2, 3, and 4, and each include an introduction, a literature review, as well as methods, results, and discussion sections. A bridging manuscript section is included between Chapters 2 and 3 as well as between Chapters 3 and 4 to detail the links between studies. The dissertation begins with a comprehensive review of the literature (Chapter 1) and ends with a conclusion (Chapter 5) that summarizes and integrates the findings from the studies. As each study is built upon a similar overarching objective, there is a small degree of repetitiveness in the introductions and methods of the otherwise independent studies that make up this program of research. This dissertation was written in accordance with

the guidelines established by the Faculty of Graduate and Postdoctoral Studies at McGill University.

CHAPTER 1

Review of Literature

Over the past decade, the role of negative emotions in non-suicidal self-injury (NSSI) has been widely researched (e.g., Chapman, Brown, & Gratz, 2006; Nock, 2009). In contrast, there is a paucity of research on the regulation of positive emotions for those with self-injury. Accordingly, the overarching purpose of this dissertation was to clarify the role of positive emotions, particularly their reactivity and regulation in non-suicidal self-injury (NSSI). The present review explores NSSI as a behaviour requiring further research and the need for a theoretical framework that broadens our understanding of the factors that increase the likelihood of engagement in this behaviour. First, a broad overview of NSSI will be provided. Specifically, NSSI will be operationally defined. Prevalence rates, the development of this behaviour, and conceptual issues around the diagnostic criteria of NSSI will then be presented. Subsequently, the Broaden and Build Theory will be explained. Emotional reactivity and emotional regulation will each be presented, and the current literature and identifying areas requiring further research will be explored. This chapter will conclude by presenting the specific aims and implications of this dissertation.

Non-Suicidal Self-Injury

Non-suicidal self-injury (NSSI) is defined as intentionally inflicting damage to one's own body, without suicidal intent and for purposes not socially sanctioned (International Society for the Study of Self-Injury, 2007; Klonsky, 2007; Nixon & Heath, 2009). NSSI includes behaviours such as cutting, scratching, and burning, but excludes extreme tattooing or body piercing (Briere & Gil, 1998; Nixon & Heath, 2009; Sornberger, Heath, Toste, & McLouth, 2012; Walsh, 2009). Across the literature, various terms similar to NSSI including *self-injurious*

behaviour, parasuicide, deliberate self-harm, and *self-cutting,* are also used (Nixon & Heath, 2009). Often, behaviours with suicidal intent are also included in these terms. Accordingly, the dissimilar terms and their appropriate definitions present a challenge when making comparisons across studies of prevalence rates and factors associated with NSSI (Nixon & Heath, 2009).

Despite these conceptual issues, researchers have indicated that lifetime NSSI is alarmingly prevalent. Prevalence rates are studied independently for clinical and community populations. Among clinical samples, 40%–61% of adolescents in psychiatric inpatient settings (Darche, 1990; DiClemente, Ponton, & Hartley, 1991) report having engaged in NSSI in their lifetime. Slightly lower levels are reported among community populations, with prevalence rates ranging from 3% to 41% among adolescents (Muehlenkamp, Claes, Havertape, & Plener, 2012; Swanell, Martin, Page, Hasking, & St John, 2014), 12% to 38% among young adults (Gratz, Conrad, & Roemer, 2002; Heath et al., 2008; Swanell et al., 2014; Whitlock, Eckenrode, & Silverman, 2006), and include approximately 6% of adults (Klonsky, 2011; Swanell et al., 2014).

In addition to being a prevalent behaviour, a majority of individuals start to engage in NSSI at a very young age. Numerous studies have reported that the first incidence of NSSI typically occurs between the ages of 12 and 16 (e.g., Heath et al., 2008; Muehlenkamp & Gutierrez, 2007; Nock & Prinstein, 2004; Ross & Heath, 2002). However, NSSI has also been reported in children under the age of 12 (e.g., Baetens et al., 2014; Esposito-Smythers et al., 2010; Hankin & Abela, 2011; Nock & Prinstein, 2004; Ross & Heath, 2002) and in children as young as 6-years-old (Nock & Prinstein, 2004).

Although by its very definition, NSSI does not involve a suicidal intent, it is associated with an increased risk of suicide (e.g., Andover et al., 2012; Andrewes, Hulbert, Cotton, Betts, & Chanen, 2017; Muehlenkamp & Gutierrez, 2007; Nock et al., 2006). Indeed, researchers have

found that adolescents that engage in NSSI report significantly more suicidal ideation than those that do not engage in NSSI (e.g., Andover et al., 2012; Muehlenkamp & Gutierrez, 2007). In addition to increases in suicidal ideation, Nock and colleagues (2006) found that adolescents that engage in NSSI are more likely to attempt suicide. Nock et al. (2006) conducted clinical interviews with 89 adolescents in a psychiatric impatient unit that engage in NSSI and found that an alarming 70% of the adolescents had attempted suicide at least once and 55% reported multiple suicide attempts. Thus, it is apparent that NSSI is a highly prevalent behaviour that is associated with serious co-occurring risks.

In recent years, NSSI has been included in the most recent version of the Diagnostic and Statistics Manual of Mental Disorders (5th ed; DSM–5; American Psychiatric Association, 2013), which further attests to the growing concern for NSSI within the field of mental health (Plener & Fegert, 2012). More specifically, NSSI Disorder (NSSID) has been added to the DSM-5 as a diagnostic entity needing further research (American Psychiatric Association, 2013). Previously, NSSI was referred to in the DSM-IV-TR (APA; 2000) as one of the criteria of Borderline Personality Disorder (BPD); yet, NSSI is not unique to BPD (Glenn & Klonsky, 2013; Selby, Bender, Gordon, Nock, & Joiner, 2012). Although the changes put forth in the new version of the DSM reflects the behaviour more accurately, the new criteria set forth by the DSM-5 proposes significant challenges to research involving individuals with a history of NSSI engagement. In particular, according to the DSM, individuals must have engaged in self-injury a minimum of five times in the past year to meet the diagnostic criteria (APA, 2013). According to a study by Kiekens and colleagues (2018), only 0.8% of college students met the DSM-5 criteria of NSSI. Similarly, Muehlenkamp and Braush (2016) found that only 34.2% of participants with a history of NSSI had done so in the last year. Consequently, it is possible that

many individuals who have previously participated in research studies may not sufficiently meet these criteria. Furthermore, by using the current DSM-5 criteria, we may only be capturing a glimpse of what emotional processes, such as reactivity and regulation, look like in the most severe cases of NSSI. Thus, the use of the current DSM-V criteria for participant selection, will exclude many individuals who do have a history of the behaviour, and may not provide researchers with an accurate picture of the population engaging in NSSI and their motivations for this behaviour. It is also possible that the current DSM-V criteria will be modified given the research being conducted since the DSM-V has been released.

Theoretical Framework

The broaden-and-build theory of positive emotions is a theoretical framework that stems from positive psychology (Fredrickson, 2001). The theory asserts that "certain discrete positive emotions—including joy, interest, contentment, pride, and love—although phenomenologically distinct, all share the ability to broaden people's momentary thought-action repertoires. These discrete positive emotions also build an individual's enduring personal resources, ranging from physical and intellectual resources to social and psychological resources (Fredrickson, 2001, p. 3)". In contrast to negative emotions, which are associated with specific action tendencies that focus and narrow thoughts, positive emotions broaden one's thoughts and actions (Fredrickson, 2001; Tugade & Fredrickson, 2004, 2007). Such action tendencies referenced by Frederickson (2001) are the actions generally required in order to regulate one's emotions. In particular, studies have found that people experiencing positive affect show thought patterns that are flexible, creative, and efficient compared to individuals experiencing negative affect (e.g., Fredrickson & Branigan, 2000; Isen, 2000). Furthermore, positive emotions can reduce or undo

the short-term impact of negative emotions, which Fredrickson refers to as the undoing hypothesis (Fredrickson, 2001; Tugade & Fredrickson, 2007).

Fredrickson's hypothesis (2001) has been empirically tested and confirmed in laboratory settings (e.g., Fredrickson & Levenson, 1998; Fredrickson, Mancuso, Branigan, & Tugade, 2000). For example, Fredrickson and Levenson (1998) conducted an experiment where they showed 60 university students a fear-eliciting film followed by a second film that was randomly selected to convey contentment, amusement, neutrality or sadness. Participants who saw one of the films with a positive tone experienced a shorter period of return to their pre-film levels of heart rate compared to the participants who viewed the neutral or sad film. These findings were later replicated by Fredreickson and colleagues (2000) which provides further support for the undoing hypothesis. Accordingly, recurrent experiences of positive emotions have the ability to help individuals strengthen their ability to regulate emotions and foster resilience (e.g., Aspinwall, 2001; Frederickson & Joiner, 2000; Tugade & Fredrickson, 2007).

Emotion Regulation

There are several definitions of emotion regulation employed in the literature. Thompson's (1994) definition is the most commonly used, stating that it is composed of "extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions to accomplish one's goals" (p. 27). More specifically, emotion regulation targets the intensive and temporal features of an emotion by either enhancing or subduing the intensity of the experienced emotion (Thompson, 1994). Furthermore, emotion regulation includes not only acquired strategies but also external influences and interventions of others (Thompson, 1994).

Gross and Thompson (2011) define emotion regulation as "the heterogeneous set of processes by which emotions are themselves regulated" (p. 7). The emotion regulation processes that Gross and Thompson (2011) describe can be intrinsic and extrinsic, conscious or unconscious, increase or decrease negative and positive emotions, and temporal in nature. Similarly, Calkins (2010) refers to emotion regulation as "those behaviours, skills, and strategies, whether conscious or unconscious, automatic or effortful that serve to modulate, inhibit, and enhance emotional experiences and expressions" (p. 92).

In summary, despite variations in definitions among authors, the components of emotion regulation are relatively constant. Specifically, emotion regulation: (a) encompasses both negative and positive emotions; (b) occurs at multiple times during the emotion generative process; (c) involves a continuum of conscious and unconscious regulation; (d) is an intrinsic and extrinsic process; and (f) is influenced by biological factors such as temperament.

Factors that influence emotion regulation. In order to fully understand the manner by which individuals experience, process, and react to emotions, it is important to evaluate beyond emotion regulation. Rather, as described further below, it is essential to also investigate the factors that influence one's ability to regulate their emotions, such as emotional reactivity.

Reactivity, which is defined as individual differences in the intensity and temporal nature of behavioural or physiological responses to emotional stimuli, is related to emotion regulation (Calkins, 2004; Chapman et al., 2006; Rothbart & Sheese, 2011). Emotional reactivity comprises several components, including the extent to which the individual experiences emotions in reaction to stimuli (i.e., emotional sensitivity), how strongly or intensely their experience is (i.e., emotional intensity), and the period of time needed before returning to a baseline level of arousal (i.e., emotional persistence; Nock, Wedig, Holmberg, & Hooley, 2008).

Reactivity has been studied throughout the lifespan. Early in life, temperament impacts the development of emotion regulation, including the display of emotions as well as emotion regulation strategies (Calkins, 2004). Calkins (2004) hypothesized that infants who are highly reactive and thus cry more easily, intensely, and for longer periods of time. As a result, these children have more difficulties practising regulatory skills of gaze aversion, distraction, and self-soothing. Their strong reactions and high arousal to stimuli prevent them from effectively regulating their emotions (Calkins, 2004). This hypothesis is supported by empirical studies, which have found that easily distressed infants are less likely to use regulatory behaviours, such as distraction, self-soothing, or help seeking, to reduce negative affect (e.g., Braungart-Rieker & Stiffer, 1996; Calkins, Dedmon, Gill, Lomax, & Johnson, 2002; Calkins & Johnson, 1998; Rothbart, Posner, & Boylan, 1990). Studies that involve adolescents and adults have found similar results whereby individuals who reported more frequent and more intense emotional reactivity as children were found to use less healthy emotion regulation strategies, such as reappraisal, and more unhealthy emotion regulation strategies, such as avoidance as adults (e.g., Carthy, Horesh, Apter, & Gross, 2009; Lynch, Robins, Morse, & Krause, 2001).

Furthermore, emotional reactivity is believed to be stable across all emotions. Specifically, it has been found that individuals who experience strong positive emotions will also experience strong negative emotions (Larsen & Diener, 1987). However, it is of note that differences in the reactivity of negative and positive emotions are present when we look more closely at populations with known emotion regulation difficulties.

Regulation of negative emotions. Individuals employ a number of strategies, both healthy and unhealthy, in order to regulate their emotions following the experience of a negative event (Gross & John, 2003). Individuals can employ healthy emotion regulation strategies to

help cope with the experience of a negative event (Gross & John, 2003). These strategies include positive reappraisal, which refers to altering the meaning of a negative situation, and acceptance, which refers to coming to terms with what one has experienced (Garnefski, Kraaij, & Spinhoven, 2001; Gross & John, 2003). In general, these strategies help individuals to accept, process, and to effectively modulate the experience of negative emotions (Gratz & Roemer, 2004). The use of healthy coping strategies is associated with optimism, self-esteem, life satisfaction and is also negatively related to feelings of anxiety (Carver, Scheier, & Weintraub, 1989; Garnefski et al., 2001; Gross & John, 2003).

In contrast, there are a handful of unhealthy strategies that individuals can employ while experiencing negative emotions that do not successfully work to downregulate unwanted or unpleasant emotions. In particular, these unhelpful strategies include rumination, which involves the focus on thoughts and feelings associated with a negative event, catastrophizing, which refers to thoughts that exaggerate the negative impact of the situation or event, and suppression, which consists of inhibiting ongoing behaviours or thoughts (Garnefski et al., 2001; Gross & John, 2004).

The use of such unhealthy strategies negatively predicts overall well-being (Gross & John, 2003). For example, levels of stress are predicted by the use of strategies such as rumination and self-blame (Martin & Dahlen, 2005). Individuals who rely on these strategies experience high levels of depressive and anxious symptoms (Garfenski et al., 2001; Legerstee, Garnefski, Verhulst, & Utens, 2011; Silk, Steinberg, & Morris, 2003) and are more likely to engage in risky behaviours, such as alcohol and drug use, as well as risky sexual behaviours (Auerbach, Claro, Abela, Zhu, & Yao, 2010; Hessler & Katz, 2010; Silk et al., 2003).

Regulation of positive emotions. The regulation of positive emotions involves the use of strategies to alter the experience and expression of positive emotions either through the upregulation, downregulation, or maintenance of the emotion (Tugade & Fredrickson, 2007; Fredrickson & Joiner, 2018). For example, savouring is an emotion regulation strategy that is used to maintain as well as extend positive emotional experiences (Bryant, 2003; Tugade & Fredrickson, 2007). This strategy involves the conscious reflection on past, current, or future positive experiences (Bryant, 2003; Carl, Soskin, Kerns, & Barlow, 2013; Tugade & Fredrickson, 2007). The use of such strategies has been linked to increased well-being and resilience (Tugade & Fredrickson, 2007). On the other hand, individuals may use a strategy which involves the dampening of positive emotions. Dampening of positive emotions entails the downregulation of positive affect through a focus on negative thoughts, such as thinking that one does not deserve to feel good (Carl et al., 2013; Feldman, Joormann, & Johnson, 2008). The use of this strategy results in the minimization and/or elimination of positive affect (Carl et al., 2013) and is associated with reduced levels of self-esteem and increased levels of rumination and depressive symptoms (Feldman et al., 2008). Considering that the studies above have been conducted with typical populations, the above-mentioned information may not generalize to individuals who engage in NSSI.

NSSI and Emotions

Given its high prevalence and associated health risks, researchers have exhaustively investigated the reasons for or motivating factors of NSSI (e.g., Claes, Klonsky, Muehlenkamp, Kuppens, & Vandereycken, 2010; Klonsky, 2007, 2009; Nock, Prinstein, & Sterba, 2009). Klonsky (2007) conducted a comprehensive review in order to better understand the functions of NSSI. In this review, Klonsky reviewed 18 studies that directly addressed the functions of NSSI,

including motivations or variables temporally associated with NSSI. Studies that examined self-injurious behaviours without ruling out suicidal intent were excluded from Klonsky's analysis. The results of this meta-analysis revealed that the regulation of negative emotions was the most frequently endorsed function for engaging in NSSI in the majority of studies.

Researchers have also investigated the specific changes in affective state of individuals following NSSI (e.g., Claes et al., 2010; Klonsky, 2009; Nock et al., 2009). According to a study by Klonsky (2009), 85% of participants indicated that the reason they self-injure was to reduce negative affect. A majority of participants also expressed feelings of sadness, hurt, frustration, and anxiety prior to engaging in these behaviours. However, they reported feeling calm and relieved after engaging in NSSI. A study conducted by Claes and colleagues (2010) that focused on NSSI in patients with eating disorders produced similar findings. More specifically, following NSSI, participants reported an increase in positive-low arousal emotions, such as relief, and a decrease in negative-high arousal emotions, such as anxiety and depression. Overall, these results highlight the centrality of emotion dysregulation experienced by individuals who engage in NSSI.

Emotional reactivity and NSSI. The reactivity of negative emotions has been widely studied in individuals who engage in NSSI. Researchers have suggested that emotional reactivity is a genetic predisposing factor that influences the emotion dysregulation, which has been associated with NSSI engagement (e.g., Gratz, 2003; Gratz & Roemer, 2004; Linehan, 1993). For example, Nock, Wedig, Holmberg, and Hooley (2008) conducted a study and determined that emotional reactivity plays a role in the development and maintenance of NSSI. The results of this study revealed that individuals who engage in NSSI are more likely to report higher levels of negative emotional reactivity. Similarly, Jenkins and Schmitz (2012) found that

emotional reactivity was related to high levels of the overall frequency of NSSI committed by participants. Furthermore, no differences have been found between the reactivity of negative emotions in females and males who have a history of engaging in NSSI (e.g., Kleiman, Ammerman, Look, Berman, & McCloskey, 2014; Nock et al. 2008).

Previous research supports the influence of emotional intensity and poor distress tolerance on individuals' engagement in NSSI (e.g., Anderson & Crowther, 2012; Baetens, Claes, Willem, Muehlenkamp, & Bijttebier, 2011; Hankin & Abela, 2011; Jenkins & Schmitz, 2012; Ross & Heath, 2002; Turner, Chapman, & Layden, 2012). For example, a study conducted by Baetens and colleagues (2011) revealed that adolescents who engage in NSSI are more likely to report greater levels of negative affect and frustration compared to individuals who do not engage in NSSI. Similarly, Anderson and Crowther (2012) found that undergraduate students who had a history of NSSI had more intense emotional experiences compared to those who had never engaged in NSSI.

To date, there are no studies that explore the emotional reactivity of positive emotions in individuals who engage in NSSI. Accordingly, the role of reactivity to positive emotions on the dysregulation of affect remains unknown. In contrast, researchers have investigated such processes in other populations that have been known to have difficulty regulating emotions. Consequently, it is possible that such processes also have relevance to NSSI.

Within the depression literature, there are two domain views relating to the reactivity of emotions; those of negative potentiation and positive attenuation (Bylsma, Morris, & Rottenberg, 2007). According to Bylsma and colleagues (2007), negative potentiation is the view that individuals with depression display high levels of emotional reactivity in the face of negative emotions, whereas positive attenuation holds that these individuals display reduced levels of

reactivity in response to positive emotions. Several studies that have been conducted on the subject have consistently found that individuals suffering from depressive symptoms demonstrate reduced responses to positive emotionally significant stimuli (e.g., Mneimne, McDurmut, & Powers, 2008; Rottenberg, Kasch, Gross, & Gotlib, 2002; Suslow et al., 2010). There is also evidence that indicates that these individuals are not able to maintain their positive emotions, and thus they are present for less time (Heller et al., 2009).

In summary, the majority of literature on NSSI is limited to reactivity of negative emotions. While it has been well established that individuals with a history of engaging in NSSI display elevated levels of reactivity in response to negative emotions (e.g., Jenkins & Schmitz, 2012; Nock et al., 2008;), the study of reactivity of positive emotions in this population has been largely omitted. However, there is a body of literature in the area of depression that illustrates the utility of investigating the reactivity of positive emotions in populations with emotional dysregulation (e.g., Mneimne et al., 2008; Suslow et al., 2010). Given these findings, it is possible that individuals who engage in NSSI also demonstrate different patterns of reactivity depending on the valence of the emotion experienced. Such information would enable us to better understand the pattern of emotional reactivity in individuals who engage in NSSI and identify further risk factors as well as potential areas of intervention.

NSSI and emotional dysregulation. The experiential avoidance model (EAM) of deliberate self-harm (Chapman et al., 2006) proposes that NSSI "is a negatively reinforced strategy for reducing or terminating unwanted emotional arousal" (p. 372). Given a number of predisposing risk factors, individuals may have difficulty regulating their emotions in the face of a stressful or unpleasant event. These risk factors include (a) high emotional intensity, (b) poor distress tolerance, (c) emotion regulation deficits, and (d) difficulty self-regulating when aroused.

These risk factors can also increase the intensity of the emotional response, which, in turn, provokes avoidance in individuals upon experiencing negative emotions. In an effort to escape this unpleasant affective state, and without the appropriate helpful strategies to effectively regulate such emotions, individuals may choose to engage in NSSI. The reduction of the unpleasant mood negatively reinforces NSSI, thereby creating a continuous cycle including unpleasant affective states and NSSI. Over time, this association may strengthen and NSSI becomes an automatic response to stressful events.

There is also empirical evidence to support the relation between difficulties with emotion regulation and NSSI (e.g., Gratz & Roemer, 2008; Heath et al., 2008; Howe-Martin et al., 2012; Najmi, Wegner, & Nock, 2007). For example, Gratz and Roemer (2008) conducted a study to understand the relation between emotion dysregulation and NSSI in a sample of female college students. The researchers found that individuals who engaged in NSSI had a limited knowledge of emotion regulation strategies compared to individuals who did not engage in NSSI. Additionally, Heath and colleagues (2008) discovered that college undergraduates who engaged in NSSI did not appear to have an adequate repertoire of emotion regulation strategies to use when they are dealing with stressful situations.

NSSI and negative emotion regulation. Individuals with a history of engaging in NSSI have also been found to use unhealthy regulatory strategies in the face of negative emotional experiences (e.g., Andrews et al., 2013; Armey & Crowther, 2008; Gratz & Roemer, 2008; Hasking, Moment, Swannell, & Chia, 2008; Heath et al., 2008; Hoff & Muehlenkamp, 2009; Najmi et al., 2007). For example, a study by Williams and Hasking (2010) found a relation between low levels of cognitive reappraisal and NSSI in a sample of university undergraduates. The use of unhealthy strategies such as expressive suppression (e.g., Andrews et al., 2013;

Hasking et al., 2008; Turner et al., 2012) and rumination (e.g., Andrews et al., 2013; Hasking et al., 2008; Turner et al., 2012) have also been found to increase the risk of NSSI. Such behaviours have been found to increase the likelihood of engaging in NSSI as these individuals are less effective in coping with the negative emotions. To date, the research conducted on the use of emotion regulation strategies in this population has solely focused on the down-regulation of negative affect.

NSSI and positive emotion regulation. Until recently, there have been no studies to explicitly look at the link between positive emotional regulation and NSSI. However, there have been some studies that examine the use of positive emotion regulation strategies in individuals suffering from symptoms of depression and borderline personality disorder; two disorders that have both been linked to NSSI (e.g., Rosenbaum Asarnow et al., 2011; Trepal & Wester, 2007; You, Deng, Zhang, & Li, 2013) and emotion dysregulation (e.g., Conklin, Bradley, & Westen, 2006; Glenn & Klonsky, 2009; Rosenthal, Gratz, Kosson, Cheavens, Lejuez, & Lynch, 2008). In particular, researchers have identified that individuals with significant levels of depressive symptoms report the elevated use of dampening of positive emotions compared to individuals without such symptoms (Eisner, Johnson, & Carver, 2009; Feldman et al., 2008; Raes, Smets, Nelis, & Schoos, 2012). It is the use of such strategies that have been linked to the maintenance of depressive symptoms (Feldman et al., 2008).

There is also evidence that these individuals are less likely to savour the positive emotions that they are currently experiencing (Eisner et al., 2009) as well as being less prone to reminisce about past events and anticipate future events (Bryant, 2003). Furthermore, individuals diagnosed with major depressive disorder have been found to be more likely to suppress their positive emotions when compared to individuals without the disorder (Beblo et al.,

2011). A similar study conducted by Beblo and colleagues (2013) found that individuals with borderline personality have been found to engage in increased suppression of their positive emotions when compared to healthy individuals.

However, it is estimated that 38% of individuals with depression (Rosenbaum Asarnow et al., 2011) and between 65-80% of individuals with borderline personality disorder (Clarkin, Widiger, Frances, Hurt, & Gilmore, 1983; Soloff et al., 1994) report having engaged in NSSI. Consequently, not all individuals with symptoms of depression or borderline personality disorder will engage in NSSI. Thus, it is possible that these studies exclude a large percentage of individuals who engage in NSSI. Research that looks primarily at individuals who engage in NSSI would provide a better picture of these processes in the population of interest.

Induction of mood in individuals with a history of engaging in NSSI. Much of the research that investigates the experience of emotions and emotion dysregulation in individuals who engage in NSSI has been conducted either through retrospective reports or diary studies where individuals indicate their emotions and their experience of such emotions as soon as they are able to following the event (e.g., Adrian et al., 2011; Gratz & Roemer, 2004; Victor & Klonsky, 2014). However, these studies very rarely target emotions as the individual is actively experiencing them.

Mood induction studies provide researchers with the opportunity to assess participants' emotions in real time as well as manipulate the environment to elicit a desired emotion (Kučera & Haviger, 2012). Mood induction experimental designs have been previously used with individuals with a history of engaging in NSSI (e.g., Arbuthnott, Lewis, & Bailey, 2014; Bresin & Gordon, 2011; Weinberg & Klonsky, 2012). To date, researchers in the field of NSSI have used this type of design to better understand changes in negative affect following experiences of

experimentally induced pain (e.g., Bresin & Gordon, 2013; Weinberg & Klonsky, 2012). In a study by Arbuthnott and colleagues (2014), researchers induced a negative mood in individuals with a history of NSSI and eating disorders in order to examine patterns of emotional changes and rumination patterns. Participants were asked to think of an upsetting event in the past or present and to write about their feelings related to the incident. In addition, their negative and positive affect prior to and following the task were measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The researchers found that individuals with a history of engaging in NSSI reported significantly greater increases in negative affect during the task when compared to the individuals with eating disorders; whereas, the eating disordered individuals reported greater decreases in positive emotions. Overall, very few studies have used mood inducement to examine the dysregulation of emotions compared to individuals without a history of NSSI and no studies to date have included the inducement of positive emotions with this population.

Current Limitations

Although a wide body of literature supports the association between NSSI and negative emotions (e.g., Adrian et al., 2011; Gratz & Roemer, 2008; Heath et al., 2008; Turner et al., 2012), there is a paucity of research that examines the association between positive emotions and NSSI engagement. More specifically, the few studies that have investigated the role of positive emotions and NSSI engagement are those which look at the individuals' general experiences of positive emotions, such as the frequency at which positive emotions occur compared to individuals who do not engage in NSSI (e.g., Victor & Klonsky, 2014) and the removal of negative emotions (i.e., calm and relief) following engaging in NSSI (e.g., Claes et al., 2010; Klonsky, 2009; Muehlenkamp et al., 2009). However, according to Fredrickson's broaden-and-

build theory of positive emotions (Fredrickson, 1998, 2001), positive emotions are central to one's ability to effectively regulate their emotions. These positive emotions are known to provide a buffer in the face of negative emotions, and this process helps individuals to broaden the strategies that they use in regulating such emotions.

While emotion dysregulation of negative emotions has been empirically established in this population, it is possible that individuals with a history of NSSI also have differences in reacting to and regulating their positive emotions that are being overlooked. Such differences in the regulation of positive emotions have already been studied in individuals with symptoms of depression and borderline personality disorder, which are both characterized by emotion regulation difficulties (e.g., Glenn & Klonsky, 2009; Rosenthal et al., 2008). However, there is a gap in our knowledge as there is a large percentage of individuals who have self-injured and do not have symptoms of these disorders, as well as individuals with these symptoms who do not self-injure. Accordingly, an investigation of how individuals with a history of NSSI react and cope with both negative and positive emotions is necessary in order to fully understand the relationship between emotion regulation and NSSI engagement.

Principal Aims of the Research Program

The overall goal of the proposed program of research is to broaden the current understanding regarding the association between emotion regulation and NSSI through the lens of Fredrickson's (1998, 2001) broaden-and-build theory. This was done in a sample of female university students. Originally, the study aimed to included male and female students; however, due to the small number of males who were willing to participate in the research studies, only females were included.

Study 1 compares the reactivity (emotional sensitivity, intensity, and recovery) of negative and positive emotions in individuals who have a history of NSSI (within the last two years) against a comparison group of those who have never self-injured. In addition, Study 1 tests the explanatory power of individuals' reactivity to positive emotions by examining whether one's reactivity in relation to positive emotions adds to the prediction of NSSI frequency over and above the well-established relationship between negative emotional reactivity and the frequency of NSSI.

Although it has already been established that individuals with a history of NSSI have difficulties regulating their negative emotions, the link between the regulation of positive emotions and NSSI remains unexplored. Accordingly, Study 2 examines and compares the self-reports of those with a history of NSSI regarding their ability to regulate negative and positive emotions relative to those who have never self-injured. Furthermore, the emotion regulation strategies (healthy vs. unhealthy) for both negative and positive emotions that young adults with and without a history of NSSI (in the last two years) report using, are compared. While self-report questionnaires provide us with important basic first understanding of how individuals respond to and regulate their emotions, there are also limitations associated with such methodology.

Consequently, the next logical step was to objectively examine individual's reactivity and regulation of negative and positive emotions using an experimental design. Therefore, Study 3 aimed to do this using a mood inducement paradigm in order to investigate whether individuals with a history of NSSI react differently to the same set of negative and positive videos in terms of their sensitivity. In addition, Study 3 compares the mood induction of positive and negative

emotions with the questionnaire responses evaluating general tendencies related to emotional reactivity and regulation.

Overall, the proposed program of research will contribute to the improved understanding of the differential factors that contribute to the association between negative and positive emotions, emotion dysregulation, and the engagement in NSSI in female students.

CHAPTER 2

MANUSCRIPT 1

Negative and Positive Emotional Reactivity in Females With and Without a History of Self-Injury

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Abstract

In trying to better understand why certain individuals self-injure, researchers have proposed that high emotional reactivity for negative emotions may influence individual vulnerabilities and predispose individuals to react to stressful situations in a dysregulated manner, thus engaging in NSSI (Nock, 2009). However, the role of emotional reactivity for positive emotions in those with a history of NSSI is still unclear. Thus, the present study sought to examine group differences in the reactivity of (a) negative and (b) positive emotions in young adults who report engaging in NSSI in the past two years and a no-NSSI comparison group, and (c) to evaluate whether the reactivity of positive emotions could predict NSSI engagement when controlling for reactivity of negative emotions. The sample consisted of 96 female students who reported engaging in NSSI within the past two years (*M*age = 20.28 years, *SD* = 1.65) and an age-matched female comparison group with no NSSI history (*M*age = 20.43 years, *SD* = 1.76). Results from separate MANOVAs indicated individuals with a history of NSSI reported higher negative reactivity across all aspects (emotional intensity, sensitivity, and persistence) than the comparison group, Wilk's $\lambda = .86$, $F(3,188) = 10.65$, $p < .001$, partial $\eta^2 = .145$; however, no significant differences emerged for positive reactivity, Wilk's $\lambda = .99$, $F(3,188) = 0.52$, $p = .669$. Moreover, a logistic regression revealed that persistence of negative emotions was the only significant predictor of NSSI, Wald χ^2 (1) = 4.54, $p = .03$. The present results highlight the importance of the persistence of negative emotions for individuals who engage in NSSI. Furthermore, the current study provides the first suggestion of no significant differences in positive emotional reactivity between individuals with and without NSSI; underlining the importance of focusing on negative emotional reactivity in clinical practice as well as using positive emotions to "undo" the effect of negative emotions.

Negative and Positive Emotional Reactivity in Females With and Without Self-Injury

Non-suicidal self-injury (NSSI) is defined as intentionally inflicting damage to one's own body, without suicidal intent and for purposes not socially sanctioned (International Society for the Study of Self-Injury, 2007; Klonsky, 2007). Although a majority of studies have reported that the first incidence of NSSI occurs between the ages of 12 and 16 (e.g., Andrews, Martin, Hasking, & Page, 2014; Heath, Toste, Nedecheva, & Charlebois, 2008; Muehlenkamp & Gutierrez, 2007; Nock & Prinstein, 2004; Ross & Heath, 2002; Tatnell, Kelada, Hasking, & Martin, 2014), around a third of individuals begin engaging in self-injury in young adulthood at approximately 18-22 years of age (Hamza & Willoughby, 2014; Klonsky, 2011; Whitlock et al., 2011). In addition, lifetime prevalence rates suggest that between 12% to 35% of young adults have engaged in NSSI at least once in their lives (Brown & Plener, 2017; Gratz, Conrad, & Roemer, 2002; Heath et al., 2008; Whitlock, Eckenrode, & Silverman, 2006; Zetterqvist, Lundh, Dahlström, & Svedin, 2013). Researchers have also found that NSSI is a behaviour common in college populations (e.g., Gollust, Eisenberg, & Golberstein, 2008; Whitlock et al., 2006, 2011). When looking more particularly at college students, a majority of college students report that their first incidence of self-injury was between the ages of 14 and 15 years old (Whitlock et al., 2006). Whitlock and colleagues (2011) investigated the rates of NSSI in college students. With respect to gender, they found that female college students are nearly twice as likely to report having ever engaged in NSSI than their male counterparts. In addition, female college students report more lifetime incidents of NSSI than males. However, when considering rates of self-injury within the past year, female college students are equally as likely to engage in NSSI as males. Other studies have not found a significant difference in rates of NSSI reported by females and males (e.g., Gollust et al., 2008; Gratz, Conrad, & Roemer, 2002).

In trying to better understand why certain individuals engage in NSSI and others do not, researchers have proposed the presence of an underlying vulnerability factor that predisposes individuals to engage in this behaviour. Specifically, it is thought that those who engage in NSSI are more reactive to their emotions, in that they experience more intense emotions, which they are not necessarily able to effectively regulate (Chapman, Gratz, & Brown, 2006). The experiential avoidance model (EAM) of deliberate self-harm (Chapman et al., 2006) proposes that NSSI "is a negatively reinforced strategy for reducing or terminating unwanted emotional arousal" (p. 372). According to this model, given a number of risk factors, including high levels of emotional reactivity, individuals may have difficulty regulating their emotions in the face of a stressful or unpleasant event. In an effort to escape this unpleasant affective state, individuals may choose to engage in NSSI. The reduction of the unpleasant mood negatively reinforces NSSI, thereby creating a vicious cycle between unpleasant affective states and engaging in the behaviour (NSSI). Over time, this association strengthens and NSSI becomes a more frequent response to stressful events.

In addition, Nock (2009) proposes an integrative model of NSSI combining elements from different research areas to explain the development and maintenance of NSSI. This model proposes that individuals' risk of engaging in NSSI is increased by genetic (e.g., high emotional reactivity) and environmental factors such as childhood maltreatment and family dynamics. It is believed that beyond certain predispositions, individuals continue to engage in NSSI as it is an effective way of quickly reducing the experience of negative affect. Over time, an individual is more likely to believe that their emotions can only be effectively regulated using this behaviour.

Emotional reactivity, defined as individual differences in the intensity and temporal nature of behavioural or physiological responses to emotional stimuli, is related to emotion

regulation (Calkins, 2004; Chapman et al., 2006; Rothbart, Sheese, Rueda, & Posner, 2011). It is believed that emotion reactivity refers to the emotion-response process, where individuals attend to a situation, appraise it as relevant, and experience the activation of an emotion (Evans et al., 2016; Gross & Jazaeri, 2014). In the NSSI literature, researchers have focused on emotional reactivity as being composed of three components, including the extent to which the individual experiences emotions in reaction to stimuli (i.e., emotional sensitivity), how strongly or intensely emotions are experienced (i.e., emotional intensity), and the period of time needed before returning to the baseline level of arousal (i.e., emotional persistence; Nock, Wedig, Holmberg, & Hooley, 2008).

Emotional reactivity begins to influence one's emotion regulation abilities very early in life (Calkins, 2004). For instance, infants' strong reaction and high arousal to stimuli are believed to prevent them from learning to regulate their emotions effectively (Calkins, 2004). These difficulties appear to remain as individuals age. Studies involving adolescents and adults have found that individuals who reported both more frequent and more intense negative emotional reactivity as children were found to use less healthy emotion regulation strategies, such as reappraisal, and more unhealthy emotion regulation strategies, such as avoidance, as adults (e.g., Carthy, Horesh, Apter, & Gross, 2010; Lynch, Robins, Morse, & Krause, 2001).

Previously, researchers have found evidence to support differences in the negative emotional reactivity and poor distress tolerance of individuals who have a history of engaging in NSSI (e.g., Anderson & Crowther, 2012; Baetens, Claes, Willem, Muehlenkamp, & Bijttebier, 2011; Evans et al., 2016; Hankin & Abela, 2011; Jenkins & Schmitz, 2012; Ross & Heath, 2002; Smith, Hayes, Styer, & Washburn, 2017; Turner, Chapman, & Layden, 2012). For example, a study conducted by Baetens and colleagues (2011) investigated the differences in temperament

of 251 Flemish-speaking high school students (93 males and 158 females). Using the Early Adolescent Temperament Questionnaire-Revised (EATQ-R; Ellis & Rothbart, 2001), the authors found that individuals who had previously engaged in NSSI were more likely to display greater negative affect and frustration compared to individuals who had never engaged in NSSI. Nock, Wedig, Holmberg, and Hooley (2008) conducted a study in order to determine the role that emotional reactivity plays in the development and maintenance of NSSI. A total of 94 individuals (73 females and 21 males) ages 12-19 years were recruited from the community and local psychiatric clinics, with 56 participants having engaged in NSSI within the past year. When looking at rates of emotional reactivity on the Emotional Reactivity Scale (ERS; Nock et al., 2008), analyses revealed that individuals who had engaged in NSSI and/or have had suicidal ideation in the past two months were more likely to report higher levels of negative emotional reactivity than those who had not reported engaging in NSSI and/or having suicidal thoughts.

Similarly, Anderson and Crowther (2012) conducted a study to investigate the factors related to the maintenance of NSSI and cessation of NSSI in 214 undergraduates (150 females and 64 males) between the ages of 18 and 37. Three groups were looked at, including no history of NSSI (n =119), those who had previously engaged in NSSI but had not engaged in the behaviour for 12 or more months (n = 50), and those who were currently engaging in NSSI (n = 45). Using the The Mood and Anxiety Symptom Questionnaire-Short Form (MASQ-SF; Clark & Watson, 1991), the authors found that individuals who had a history of NSSI had more intense negative emotional experiences compared to those who had never engaged in NSSI. On the other hand, a study by Gratz (2006) examined negative and positive emotional reactivity in 249 female college students ranging from 18 to 55 years-old. This sample comprised 91 individuals who at least one occurrence of engaging in NSSI (cutting, scratching and carving), however, 42

of these individuals reported having engaged in NSSI more than 10 times. Using the Affect Intensity Measure (AIM; Larsen & Diener, 1987), Gratz (2006) found that individuals with a history of engaging in NSSI more than 10 times did not report significantly more negative emotional reactivity when compared to individuals who have never engaged in NSSI. Interestingly, it was found that females with a history of engaging in NSSI reported less intense positive emotions compared to individuals who do have such a history. To date, this is the only study that investigates the role of reactivity of positive emotions and NSSI. However, one potential limitation of this original investigation is that the measure used, the AIM (Larsen & Diener, 1987), only takes into consideration the intensity of experienced emotions, and thus fails to address the measurement of the two other components of emotional reactivity, sensitivity, and persistency.

There is also evidence to suggest that emotional reactivity can influence the frequency in which individuals engage in NSSI (e.g., Jacobson, Hill, Pettit, & Grozeva, 2015; Jenkins & Schmitz, 2012). For instance, a study by Jenkins and Schmitz (2012) investigated the relation between negative emotional reactivity and the experience of negative and positive emotions in a group of 115 undergraduate students (84 females). The authors used the Emotion Reactivity Scale (ERS; Nock et al., 2008) and found that individuals with a history of NSSI (at least once in the past) reported an increase in positive affect following engaging in the behaviour. In addition, individuals with a history of engaging in NSSI reported significantly higher levels of negative emotional reactivity compared to individuals who have never engaged in NSSI.

Furthermore, there is mixed evidence with respect to gender differences in the reactivity of negative emotions in those who have a history of engaging in NSSI. In particular, the study by Baetens and colleagues (2011) mentioned above, found that females reported significantly

higher negative affectivity than males. In contrast, males were found to score significantly higher than females on the positive reactivity (Baetens et al., 2011). A second study found that female adults with a history of NSSI reported significantly higher negative emotional reactivity scores than males (Kleiman, Ammerman, Look, Berman, & McCloskey, 2014). In contrast, Nock and colleagues (2008) did not find any gender differences in negative emotional reactivity in individuals who reported a history of engaging in NSSI. Clearly further exploration of possible gender differences in negative and positive emotional reactivity are warranted. Although initially the present study had sought to investigate these differences, the low response rate of male participants made such comparisons impossible. Therefore, the present study is limited to female university students as described in the methods.

To date, most of the research in the field of NSSI has investigated the reactivity of negative emotions and there is a paucity research on the reactivity of positive emotions in individuals who have a history of engaging in NSSI. According to Fredrickson's (2001, 2004, 2013; Frederickson & Joiner, 2002, 2018) broaden-and-build theory, positive emotions play an important role in the regulation of negative emotions as well as fostering resilience (Frederickson & Joiner, 2002, 2018; Tugade & Frederickson, 2007). Accordingly, the present study aims to investigate the relation between emotional reactivity of positive emotions and individuals' engagement in NSSI.

Current Study

The objectives of the current study were to (1) examine group differences in the reactivity of negative emotions in young female adults who report engaging in NSSI in the past two years (NSSI group) and a comparison group of individuals who had not self-injured, (2) to investigate group differences in the reactivity of positive emotions in young female adults who report

engaging in NSSI in the past two years compared to those who have never engaged in NSSI , and (3) to evaluate whether the reactivity of positive emotions could predict NSSI engagement when controlling for reactivity of negative emotions. Specifically, hypotheses associated with these objectives are as follows. It is hypothesized that female university students who engaged in NSSI in the past two years would report increased levels across the three components of negative emotional reactivity; sensitivity, intensity and time needed to recover (persistence) from their negative emotions than individuals who have never engaged in NSSI (H1). Secondly, it was hypothesized that individuals with a history of engaging in NSSI would report lower levels of positive emotional reactivity (sensitivity, lower intensity, and lower persistence) when faced with positive emotions relative to individuals without a history of NSSI (H2). Thirdly, it was hypothesized that lower levels of reactivity to positive emotions would significantly and independently predict individuals' history of NSSI engagement when controlling for high levels of negative emotional reactivity (H3).

Method

Participants

Participants were recruited from a large urban area Canadian university. The overall sample consisted of 98 female participants but two participants were removed for being univariate outliers (see Results section for details). Thus, the final sample consisted of 96 female participants who reported engaging in NSSI at some time over the past two years (*M*age = 20.28 years; *SD* = 1.65), as well as an age-matched control group of 96 female participants with no history of NSSI engagement (*M*age = 20.43 years; *SD* = 1.76). Participants ranged in age from 18-25 years. The majority of participants reported their ethnicity as Caucasian (55.7%), followed by Asian (33.3%), mixed (6.3%) and other (4.7%). Additional demographic information (i.e.,

place of birth) was not collected. Only females were included in this study as there was an insufficient number of males who came forward to participate in the study.

Individuals who reported having engaged in NSSI over 2 years ago were not included in the study. With regard to NSSI frequency, participants included individuals reported having engaged in NSSI once (5.2%), two to four times (5.2%), five to ten times (12.5%), eleven to fifty times (44.8%), fifty-one to one-hundred times (10.4%), and more than one-hundred times (21.9%) over the past 2 years.

Measures

NSSI screening questionnaire. The Stress and Coping Questionnaire is a self-report questionnaire developed by the researchers to assess stress and coping in a university sample while also providing preliminary screening information for self-injury. Each statement on the questionnaire assesses the use of both healthy (e.g., meditation, talking to a friend) and unhealthy coping (e.g., excessive alcohol intake, NSSI) behaviours in an individual's lifetime and in the past 12 months. In addition, the questionnaire identifies whether individuals have used the healthy and unhealthy behaviours to cope with stress. NSSI is included as one of the listed behaviours ("physically hurt myself on purpose without wanting to die"). This item was used to provide preliminary information to identify individuals who may be currently engaging in self-injury as well as anyone who may have engaged in such behaviour in the past from the larger sample. If individuals indicated yes, they were asked more detailed questions about their self-injury.

Non-suicidal self-injury. The Inventory of Statements about Self-Injury (ISAS; Klonsky & Glenn, 2009) is a self-report measure that assesses various aspects of non-suicidal self-injury (NSSI). The ISAS is broken up into two sections related to the frequency and the

functions of NSSI. For the purpose of this study, only information relating to the frequency of NSSI was used. The first section of the ISAS assesses the lifetime frequency of 12 different NSSI behaviours performed "intentionally (i.e., on purpose) and without suicidal intent," (i.e., banging/hitting body parts, biting, burning, carving, cutting, interfering with wound healing, sticking self with needles, pinching, pulling hair, rubbing skin against rough surfaces, severe scratching, and swallowing dangerous chemicals). In addition, the questionnaire assesses descriptive features of NSSI including the age of NSSI onset, date of most recent NSSI episode, number of times having engaged in NSSI, the experience of physical pain during NSSI, the time between the initial urge to self-injure and the NSSI act, and the tendency to self-injure while alone. The ISAS has demonstrated excellent internal consistency (Cronbach's $\alpha = .84$), concurrent validity, and adequate test-retest reliability (Glenn & Klonsky, 2011; Klonsky & Glenn, 2009) for the reporting of NSSI frequency. This measure was only administered to individuals who indicated on the Stress and Coping Questionnaire that they had ever engaged in NSSI in order to specifically identify individuals who had engaged in NSSI over the past two years.

Emotional reactivity. All participants completed the Emotion Reactivity Scale (ERS; Nock et al., 2008), a 21-item questionnaire developed to assess how individuals experience emotions. In particular, the ERS assesses three areas of the experience of emotions, including: (a) sensitivity (e.g., Even the littlest things make me emotional), (b) intensity (e.g., When I experience emotions, I feel them very strongly/intensely), and (c) persistency (e.g., When something happens that upsets me, it's all I can think about it for a long time). Validation of this measure has demonstrated good internal consistency (Cronbach's $\alpha = .94$) and adequate construct validity when compared to other measures (Nock et al., 2008). The ERS is a commonplace scale

used in studies measuring emotional intensity in individuals who engage in NSSI. For the purpose of this study, questions that are the positive emotion equivalents for each item were added to the scale. For example, "When something happens that makes me happy, it's all I can think about it for a long time." In the present study, the internal consistency of the ERS was also good both for negative emotional reactivity (Cronbach's α: overall =.95; sensitivity = .89; intensity = .89; persistence = .80) and for positive emotional reactivity (Cronbach's α: overall =.93; sensitivity = .87; intensity = .84; persistence = .77).

Procedure

The following procedure for the study received Research Ethics Board (REB) clearance from the university's ethics committee. Participants were recruited in two ways. First, participants were recruited from a research team database of individuals who had agreed to be contacted to participate in future studies of stress and coping and had also completed an early screening pertaining to their self-injury engagement.

Participants were also recruited from an ad posted on the McGill Classifieds and social media. The study was advertised as a study investigating the emotion regulation of negative and positive emotions. Participants were sent an e-mail invitation briefly describing the study and they were given a link to the online study hosted on LimeSurvey as well as a participant ID. Upon accessing this link, participants viewed an informed consent page at the beginning of the online survey, which stated that all information collected would remain confidential. The participants were also informed that they were free to withdraw from the study at any time without penalty.

The online survey consisted of the battery of questionnaires described in the methods section of this manuscript. Participants started by completing the Stress and Coping

Questionnaire. Individuals who indicated that they had engaged in NSSI in their lifetime, were given the ISAS to complete. Those who indicated that the last time they had engaged in NSSI was in the last two years (dated from the day they filled out the survey), were included in the sample. All participants were given the ERS to complete. Following completion of the survey, each participant was sent an email which included the necessary debriefing information and received $10 as well a list of resources should they require additional support. The data was then coded and entered into a database, and no identifiable information was available through database access alone.

Results

Prior to running the main analyses, the data were cleaned separately within two groups based on whether participants reported having a history of NSSI engagement over the past 2 years or never having engaged in NSSI, according to their responses on the ISAS. Results from a Missing Values Analysis demonstrated less than 5% of missing values; therefore, the data were assumed to be missing completely at random and missing values were imputed using the Expectation Maximisation procedure. Two univariate outliers were identified within the "No NSSI" group and subsequently removed. No multivariate outliers were found. Thus, the final sample consisted of 96 female participants with a history of NSSI engagement over the past two years (*M*age = 20.28 years; *SD* = 1.65) along with an age-matched control group of 96 female participants (*M*age = 20.43 years; *SD* = 1.76).

The first objective was to investigate whether there were differences in terms of reactivity of negative emotions across NSSI status groups. It was hypothesised that individuals with a history of NSSI engagement in the past two years would report increased sensitivity, intensity, and time needed to recover (persistence) from their negative emotions. Table 1 presents the

means across NSSI status groups for emotion reactivity of both negative and positive emotions. A one-way MANOVA was conducted for the three aspects of negative emotional reactivity (sensitivity, intensity, and persistence). Both the assumption of equality of covariance and the assumption of homogeneity of variance were met. Results revealed a significant main effect for groups, Wilk's $\lambda = .86$, $F(3,188) = 10.65$, $p < .001$, partial $\eta^2 = .145$, with the NSSI engagement group showing significantly worse reactivity across all three subscales. Follow-up univariate analyses were conducted within the NSSI engagement groups. As hypothesised, individuals with a history of NSSI engagement reported increased sensitivity, $F(1,190) = 25.26$, $p < .001$, partial $\eta^2 = .117$, intensity, $F(1,190) = 25.02$, $p < .001$, partial $\eta^2 = .116$, and persistence, $F(1,190) = 29.05$, $p < .001$, partial $\eta^2 = .133$ of negative emotions.

The second objective was to investigate group differences in the reactivity of positive emotions in young adults with a history of NSSI engagement in the past two years as compared to those who have never engaged in NSSI. It was hypothesised that individuals with a history of NSSI engagement in the past two years would report lower sensitivity, intensity, and persistence of positive emotions than their no-self injury peers. A one-way MANOVA was conducted for the three aspects of positive emotional reactivity (sensitivity, intensity, and persistence). Both the assumption of equality of covariance and the assumption of homogeneity of variance were met. Contrary to H2, results revealed no significant main effects for the NSSI engagement groups, Wilk's $\lambda = .99$, $F(3,188) = 0.52$, $p = .669$.

The third objective was to evaluate whether the reactivity of positive emotions could predict having a history of NSSI engagement when controlling for reactivity of negative emotions. It was hypothesized that lower levels of reactivity to positive emotions would increase predictability of individuals' history of NSSI engagement when controlling for high levels of

negative emotional reactivity. However, given the lack of significant differences in terms of reactivity of positive emotions for individuals with and without a history of NSSI engagement, this objective and hypothesis were revised to examine the relative contribution of the negative emotional reactivity subscales (sensitivity, intensity, and persistence) to predicting history of NSSI engagement, using a binomial logistic regression. Based on the effect size of each of the negative emotional reactivity subscales in the MANOVA results presented in the first objective, sensitivity and intensity of negative emotions were entered in Block 1 and persistence was subsequently entered in Block 2. Table 2 presents the predictors in each step of the logistic regression.

Results revealed that, in Block 1, sensitivity and intensity of negative emotions significantly explained 16.3% (Nagelkerke R^2) of the variance in NSSI status as an overall model when entered together, $\chi^2(2) = 25.05$, $p < .001$. Furthermore, a Hosmer-Lemeshow test revealed that the predicted probabilities matched the observed values, χ^2 (8) = 6.68, $p = .571$, and the model successfully predicted 64.1% of cases overall. However, although the overall model was significant, of the two predictor variables, neither sensitivity, Wald χ^2 (1) = 1.62, $p = .203$, nor intensity, Wald χ^2 (1) = 1.40, $p = .237$, of negative emotions were statistically significant unique individual predictors of history of NSSI engagement when controlling for the other predictor. Finally, the inclusion of the persistence of negative emotions subscale in Block 2 was a statistically significant contribution to the model, $\chi^2(3) = 4.62$, $p = .032$, and explained a total of 19.1% of the variance in NSSI status over and above that explained by intensity and sensitivity. Similarly to Model 1, a Hosmer-Lemeshow test revealed that the predicted probabilities matched the observed values, χ^2 (8) = 5.72, $p = .678$. The model successfully predicted a total of 66.7% of all cases. Furthermore, both sensitivity, Wald χ^2 (1) = .47, $p = .493$, and intensity, Wald χ^2 (1)

= .27, p = .603, remained nonsignificant predictors of NSSI status. However, persistence of negative emotions significantly contributed to the prediction of NSSI status when controlling for the other predictors, Wald χ^2 (1) = 4.54, p = .033. As stated above, the individuals with higher persistence of negative emotions were 1.14 times more likely to report a history of NSSI engagement than those with lower persistence of negative emotions.

Discussion

The present study investigated the role of negative and positive emotional reactivity in female university students who engage in NSSI. Specifically, the research objectives were to examine whether female young adults who report having engaged in NSSI over the past two years significantly differ from those with no history of NSSI on reported levels of reactivity (sensitivity, reactivity, and persistence) of (a) negative emotions and (b) positive emotions. Furthermore, a third objective was to examine the relative contribution of both negative and positive emotional reactivity (sensitivity, reactivity, and persistence) in the prediction of NSSI engagement over the past two years; however, given the findings from the first two objectives, this objective was revised to investigate the relative contribution of the three aspects of negative emotional reactivity in predicting the history of NSSI engagement.

With regard to the relation between negative emotional reactivity and NSSI, it was hypothesized that engagement in NSSI would be related to higher levels of negative emotional reactivity. In support of our first hypothesis, individuals with a history of NSSI and without a history of NSSI significantly differed on all variables of interest with regards to the negative emotional reactivity. More specifically, individuals with a history of engaging in NSSI in the past two years reported significantly higher levels of sensitivity, intensity, and persistence (time needed to recover) when experiencing negative emotions compared to individuals who had never

engaged in NSSI. These results are congruent with previous findings linking NSSI and negative emotional reactivity (e.g., Evans et al., 2016; Gratz, 2006; Jenkins & Schmitz, 2012; Kleiman et al., 2014; Najmi, Wegner, & Nock., 2007; Smith et al., 2017). These results also align with the theoretical model put forward by Chapman and colleagues (2006), which posits that individuals who have higher levels of emotional reactivity will be more likely to engage in NSSI to reduce their experience of negative emotions.

When looking at the role of the reactivity of positive emotions and NSSI, an area requiring further exploration, our hypothesis was not supported. It was expected that individuals with a history of NSSI would report significantly lower levels of sensitivity, intensity, and persistence related to positive emotions. However, no significant differences were reported in the reactivity of positive emotions between individuals with and without a history of engaging in NSSI. The current results are inconsistent with the results of Gratz's (2006) study, which found that women with a history of engaging in NSSI reported lower levels of emotional reactivity for positive emotions. The difference in findings between the present study and Gratz's (2006) study may be due to differences in methodology. In particular, the measure that Gratz employed to measure emotional reactivity, the Affect Intensity Measure (AIM; Larsen & Diener, 1987), assesses the sensitivity and intensity of negative and positive emotions and does not include persistence. In addition, the participants in the NSSI group from Gratz's (2006) study had a history of engaging in NSSI at some point in their lifetime, whereas the participants in the NSSI group who participated in the current study had to have engaged in NSSI in the past two years. There is research that suggests that individuals who have stopped engaging in NSSI reported having different levels of distress tolerance and have acquired skills to cope with their negative emotions than individuals with more recent NSSI (Kittleman, 2014). This difference could

impact the way individuals react and cope with their emotions. In sum, further research is needed to clarify the relationship between current and past engagement in NSSI and reactivity of positive emotions.

Finally, when looking at negative or positive emotion reactivity as predictors of NSSI or non-NSSI group membership, a different pattern emerges. It was hypothesized that the three aspects of negative and positive reactivity (sensitivity, intensity, and persistence) would predict NSSI engagement in the past two years. The results indicate that some components of reactivity of negative emotions do in fact significantly predict NSSI group membership. Specifically, it was found that the longer that one's negative emotions last (greater persistence of negative emotions), the more likely an individual is to have a history of NSSI engagement over the past two years. These results are in line with the theory of the Experiential Avoidance Model of NSSI (EAM; Chapman et al., 2006), as it is likely that individuals who are experiencing long lasting negative emotions may be more prone to resorting to less healthy ways of regulating their emotions. Interestingly, sensitivity and intensity alone were not found to be predictors of NSSI, although the NSSI and no-NSSI groups were found to differ on these variables. The fact that sensitivity and intensity were not predictors may be due to the fact that sensitivity and intensity of negative emotions were not sufficiently different from one another. Nevertheless, these findings highlight that it is one's reactivity to negative emotions, particularly the persistence of negative emotions, that is associated engaging in NSSI. This finding is a significant contribution to our understanding of NSSI and has potentially important clinical implications.

In addition to working on individuals' sensitivity and intensity of negative emotions, it is equally important to target the role of emotional persistence of negative emotions when working with this population, rather than working on other aspects of reactivity such as intensity or

sensitivity. With increased sensitivity, intensity, and persistence of negative emotions, individuals with a history of NSSI are in need of effective means for distress tolerance. The role of distress tolerance in therapy with individuals who have a history of engaging in NSSI has been highlighted in Dialectical Behavioural Therapy (DBT; Linehan, 1993). Numerous studies have demonstrated that participation in DBT has resulted in the reduction of engagement in self-harm in both community and clinical samples (James, Taylor, Winmill, & Alfoadari, 2007; Linehan, Armstrong, Suarez, Allmon, & Heard, 1991; Verheul, Van Den Bosch, Koeter, De Ridder, Stijien, & Van Den Brink, 2003). Accordingly, this study provides further empirical support for the use of this modality of therapy with individuals, particularly females, who engage in self-harm.

Furthermore, the findings that positive emotional reactivity is similar in individuals both with and without a history of NSSI may be clinically relevant. In particular, it is possible that the experience of positive emotions can be integrated into the therapeutic setting and "undo" the effects of negative emotions as well as provide these individuals with a wider set of skills to cope with their negative emotions (Garland et al., 2010).

While the current study presents several findings that advance the understanding of emotional reactivity of negative and positive emotions in individuals with a history of engaging in NSSI, the study has several limitations that should be considered. First, the present study is limited to female university students, thus excluding males and young adults outside the university setting. Secondly, the results of this study were based entirely on self-report information. Future studies may want to use experimental methods to investigate the relationship between emotional reactivity of both negative and positive emotions in individuals with a history of engaging in NSSI.

Conclusion

The current findings suggest that the reactivity of positive emotions is comparable across female university students with and without a history of NSSI. However, the reactivity of negative emotions should continue to be the central focus when considering the emotional reactivity of individuals who engage in NSSI. While the role of negative emotional reactivity has already been studied at length, this study confirms these findings and provides further focus on what aspects of negative emotional reactivity are related to NSSI, particularly the persistence of negative emotions. Thus, the results of this study may have implications for the clinical treatment of individuals who engage in NSSI, specifically with respect to their tolerance of distress, as the persistence of negative emotions may be very difficult for these individuals to endure. Furthermore, given the similarities related to the reactivity of positive emotions, across groups, it is possible ones' positive emotions could serve the purpose of "undoing" negative emotions as suggested by the broaden-and-build theory.

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Table 1.
Means and Standard Deviations of Aspects of Negative and Positive Emotional Reactivity

	Negative Emotional Reactivity				**Positive Emotional Reactivity**			
	NSSI		No-NSSI		NSSI		No-NSSI	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Sensitivity	22.90	8.80	16.68	8.36	15.98	8.49	15.17	7.46
Intensity	15.60	6.69	10.84	6.50	10.01	6.10	9.89	5.02
Persistence	9.03	3.77	6.20	3.52	5.90	3.79	5.90	3.11

Table 2.
Logistic Regression Predicting Likelihood of NSSI Engagement in the Past Two Years Based on Aspects of Negative Emotional Reactivity

		B	***SE***	**Wald**	***df***	***p***	***Exp(B)***	***95% CI***	
								Lower	***Upper***
Block 0									
	Constant	0.000	0.14	0.000	1	<.001	1.00		
Block 1									
	Constant	-1.64	0.40	17.16	1	<.001	.19		
	Sensitivity	0.05	0.04	1.62	1	.203	1.05	0.98	1.12
	Intensity	0.06	0.05	1.40	1	.237	1.06	0.96	1.16
Block 2									
	Constant	-1.86	0.42	19.66	1	<.001	.16		
	Sensitivity	0.03	0.04	0.47	1	.493	1.03	0.95	1.11
	Intensity	0.03	0.05	0.27	1	.603	1.030	0.93	1.13
	Persistence	0.13	0.06	4.54	1	.033	1.14	1.01	1.29

Table 3.
Percentage of participants endorsing self-injury by method

Method of Self-Injury	**Method Endorsement (%)**
Cutting	74.0
Biting	27.1
Burning	20.8
Carving	11.5
Pinching	43.8
Pulling Hair	32.3
Severe Scratching	45.8
Banging or Hitting Self	47.9
Interfering with Wound Healing	47.9
Rubbing Skin	18.8
Sticking Needles	14.6
Swallowing Substances	14.6

Bridging Manuscripts

The overall objective of this program of research is to use the broaden-and-build theory (Fredrickson, 1998, 2001) to extend our understanding of NSSI by looking at the role of both negative and positive emotions. The first objective of this study was to investigate the reactivity (sensitivity, intensity, and persistence) of negative and positive emotions in individuals who have a history of engaging in NSSI and those who do not, as well as to understand if the reactivity of positive emotions adds any value when trying to predict NSSI engagement. Results of Manuscript 1 supported previous results in the literature with respect to the reactivity of negative emotions, in that individuals who have a history of engaging in NSSI report significantly higher levels of reactivity in the face of negative emotions. Surprisingly, the current findings suggest that female university students with and without a history of NSSI engagement do not differ in terms of reactivity of positive emotions. Additionally, it was found that the longer negative emotions last (greater persistence of negative emotions), the more likely female university students were to have a history of NSSI engagement over the past two years. Thus, the persistence of negative emotions may be the most important aspect of emotion reactivity to target in therapy for young women engaging in NSSI.

A second important factor known to be linked to individuals' engagement in NSSI is emotion dysregulation, particularly that of negative emotions (e.g., Chapman et al., 2006; Gratz & Roemer, 2008; Heath et al., 2008; Howe-Martin et al., 2012; Najmi, Wegner, & Nock, 2007). Therefore, the next step in this line of inquiry is to determine whether or not individuals with a history of engaging in NSSI demonstrate a similar pattern of difficulties in regulating negative emotions and what the potential differences are between those with and without NSSI with regards to the regulating of positive emotions. Using the same sample as in Manuscript 1,

Manuscript 2 adds to these findings by investigating whether the relationship between emotion regulation of negative and positive emotions is different in individuals who report having engaged in NSSI and those who have not. Additionally, Manuscript 2 aims to better understand the types of strategies (healthy vs. unhealthy) used by individuals (NSSI and non-NSSI) when faced with different emotions.

CHAPTER 3

MANUSCRIPT 2

Emotion Dysregulation and Non-Suicidal Self-Injury: An Investigation of Negative and Positive Emotions

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Abstract

Research has shown individuals with a history of engaging in NSSI have deficits in their ability to regulate negative emotions (e.g., Klonsky et al., 2007) and may use unhelpful coping strategies, such as expressive suppression and rumination, to cope with negative emotions (e.g., Andrews et al., 2013; Turner et al., 2012). In contrast, there is a paucity of research on the regulation of positive emotions for those with self-injury. Thus, the present study sought to investigate whether individuals who engaged in NSSI in the past two years differ from those with no NSSI in terms of (a) negative/positive emotion regulation, and (b) endorsement of healthy/unhealthy coping strategies for negative/positive emotions. Female undergraduate students who engaged in NSSI in the past two years (n=95; Mage=20.27, SD=1.65) and a gender-matched comparison group (n=95; Mage=20.43, SD=1.77) completed an online survey. Results indicated the NSSI group reported more difficulties regulating negative and positive emotions compared to the comparison group. While both groups displayed similar patterns of strategy use across emotions, results from a Cochran's Q test revealed more unhealthy strategies were chosen for situations involving negative emotions for both groups. However, chi-square tests showed those with a history of NSSI reported using significantly less healthy strategies in situations evoking positive emotions and more unhealthy strategies in situations inducing negative emotions relative to their non-NSSI peers. The present results suggest a complex pattern of negative versus positive emotion regulation and strategy use and potentially highlight the need to consider positive emotions during treatment for those with self-injury.

Emotion Dysregulation and NSSI: An Investigation of Negative and Positive Emotions

Non-suicidal self-injury (NSSI), the intentional destruction of body tissue without the intent to die and for purposes not socially sanctioned (International Society for the Study of Self-Injury, 2007; Klonsky, 2007), is a highly prevalent behaviour that typically emerges in adolescence and is associated with an increased risk of suicide (e.g., Andrewes, Hulbert, Cotton, Betts, & Chanen, 2017; Andover, Morris, Wren, & Bruzzese, 2012; Baer et al., 2017; Muelenkamp & Gutierrez, 2007; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006) and mental health problems (e.g., Benjet et al., 2017; Howe-Martin, Murrell, & Guarnaccia, 2012; Muehlenkamp & Gutierrez, 2007; Nock et al., 2006; Tanner, Hasking, & Martin, 2016). Accordingly, researchers have rigorously investigated the function of NSSI (e.g., Klonsky, 2007, 2009; Mahtani, Melvin, & Hasking, 2018; Victor, Styer, & Washburn, 2016), concluding that individuals primarily engage in NSSI to reduce their experience of negative affect. In particular, Klonsky (2007) conducted a meta-analysis to better understand the functions of non-suicidal self-injury. In this meta-analysis, Klonsky reviewed 18 studies that directly addressed the functions of NSSI, including motivations or variables temporally associated with NSSI. The results of this meta-analysis revealed that individuals primarily engage in NSSI to reduce their experience of negative affect.

Researchers have also investigated the specific changes in the affective state of individuals following engaging in NSSI (e.g., Andrewes, Hulbert, Cotton, Betts, & Chanen, 2016; Claes, Klonsky, Muehlenkamp, Kuppens, & Vandereycken, 2010; Klonsky, 2009; Nock et al., 2009). According to a study by Klonsky (2009), which included a total of 39 young adults, 85% of participants indicated the primary reason they self-injure was to reduce negative affect. A majority of participants also expressed feelings of sadness, hurt, frustration, and anxiety before

engaging in these behaviours. However, they reported feeling calm and relieved after engaging in NSSI. A study conducted by Claes and colleagues (2010) that focused on patients with eating disorders produced findings consistent with those of Klonsky (2009). In particular, participants primarily reported engaging in NSSI for reasons related to affect regulation, such as to avoid or supress negative emotions. More recently, Andrewes and colleagues (2017) used ecological momentary assessment to study the change in affect in 113 individuals, aged 15-25 years, with a diagnosis of Borderline Personality Disorder (BPD). The authors found that before engaging in NSSI, individuals felt an increase in negative emotions and a decrease in positive emotions. In addition, the participants reported a trend of feeling an increase in positive emotions and a decrease in negative emotions after having engaged in NSSI. Other researchers have documented similar findings (e.g., Jenkins & Schmitz, 2012; Nock & Prinstein, 2004). Overall, it is clear that there is a decrease in negative affect and an increase in positive emotions, such as calmness, following engagement in NSSI. Although these studies highlight the relationship between negative affective states and NSSI, this information does not explain why the experience of negative emotions increases the risk of NSSI. However, Chapman and colleagues' (2006) experiential avoidance model provides an explanation of the role of emotion regulation in the development and maintenance of NSSI. In particular, it is proposed that biological factors, including high emotional reactivity, poor distress tolerance, and the inability to regulate emotions, drives individuals to engage in NSSI in order to escape their unwanted emotional arousal (Chapman et al., 2006). More specifically, individuals may seek to escape external conditions that elicit a negative emotion or an unwanted internal experience, for instance thoughts, feelings, and physiological reactions (Anderson & Crowther, 2012; Chapman et al., 2006; Hasking, Di Simplicio, McEvoy, & Rees, 2018). The successful escape from emotional

arousal following an NSSI episode negatively reinforces and subsequently maintains the behaviour.

Chapman et al.'s (2006) model has garnered some empirical support (e.g., Howe-Martin et al., 2012; Najmi, Wegner, & Nock, 2007; Nielsen, Sayal, & Townsend, 2017). In particular, according to a study conducted by Howe-Martin and colleagues (2012) examining affect avoidance and regulation in individuals who engage in NSSI, higher levels of thought suppression differentiated adolescents with a history of NSSI from those without. Their study included 211 participants between the ages of 13 and 18, approximately half male. Additionally, Najmi et al. (2007) conducted a study in order to examine the role of thought suppression in NSSI. Their study included 94 participants (73 females, 21 males) between the ages of 12 and 19 years and found that thought suppression was associated not only with the presence of NSSI but also with the frequency that individuals engage in this behaviour. Thus, there is a suggested link between experiential avoidance, specifically thought suppression, and NSSI.

There is also empirical evidence to support the relation between emotion regulation deficits and NSSI. For example, Gratz and Roemer (2008) conducted a study to understand the relationship between emotion dysregulation and NSSI in a sample of female college students. The study included 249 female undergraduate students between the ages of 18 to 55 years. The researchers found that individuals who engaged in NSSI had limited access to emotion regulation strategies compared to individuals who did not engage in NSSI. Additionally, Heath and colleagues (2008) conducted a study to examine the characteristics of university students with a history of engaging in NSSI. The study included 728 university students (160 males, 568 females) between the ages of 18 to 55 years. The authors found that college undergraduates who engaged in NSSI did not appear to have an adequate repertoire of emotion regulation strategies

to use when they were dealing with stressful situations. Furthermore, individuals with a history of engaging in NSSI have been found to use ineffective regulatory strategies in the face of negative emotional experiences (e.g., Andrews et al., 2013; Armey & Crowther, 2008; Gratz & Roemer, 2008; Hasking, Moment, Swannell, & Chia, 2008; Heath et al., 2008; Hoff & Muehlenkamp, 2009; Najmi et al., 2007; Nicolai, Wielgus, & Mezulis, 2015; Richmond, Hasking, & Meany, 2015). For example, a study by Williams and Hasking (2010) investigated the use of coping strategies in individuals with and without a history of engaging in NSSI. Their study included a total of 289 participants (78 male and 211 female) young adults aged between 18 and 30 years. The authors found a relationship between low levels of cognitive reappraisal and NSSI in a sample of university undergraduates. The use of unhealthy strategies, including expressive suppression (e.g., Andrews et al., 2013; Hasking et al., 2008; Turner et al., 2012) and rumination (e.g., Andrews et al., 2013; Hasking et al., 2008; Turner et al., 2012), have also been found to be associated with NSSI. Such behaviours have also been associated with an increased likelihood of engaging in NSSI as they are not useful in coping with negative emotions.

As shown above, there is a good deal of research that focuses on the dysregulation of negative emotions as a primary reason for engaging in NSSI and poor use of strategies (Chapman, 2006; Klonsky, 2007, 2009; Nock, 2009). However, there is a paucity of research on positive emotion regulation and NSSI. Recently, a study was conducted by Burke and colleagues (2015) that looked at emotion regulation strategies, namely brooding of negative emotions and dampening of positive emotions. Their study included a total of 77 adolescents between the ages of 14 and 19. The researchers found that individuals who had a history of engaging in NSSI were more likely than those without the same history to use brooding and dampening towards their negative and positive emotions, respectively.

According to the broaden-and-build theory (Fredrickson, 1998, 2001), individuals' experience of positive emotions plays a more significant role in emotion regulation than does the experience of negative emotions. More specifically, the theory posits that if we have difficulty regulating negative emotions, it will be our positive emotions that will buffer us and help us to deal with the experience of negative emotions. The research described above establishes that individuals who engage in NSSI are not able to efficiently regulate their negative emotions and thus resort to using behaviours, such as NSSI to downregulate their negative emotions. However, it is unclear whether positive emotions are as dysregulated as negative emotions in individuals with a history of NSSI.

While there is a gap in the NSSI literature, there have been a number of studies that examined the use of positive emotion regulation strategies in individuals suffering from symptoms of depression and borderline personality disorder (BPD), both of which have been previously linked to NSSI (e.g., Rosenbaum Asarnow et al., 2011; Trepal & Wester, 2007; You, Deng, Zhang, & Li, 2013) as well as emotion dysregulation (e.g., Conklin, Bradley & Westen, 2006; Glenn & Klonsky, 2009; Rosenthal, Grats, Kosson, Cheavens, Lejuez, & Lynch, 2008). Individuals diagnosed with Major Depressive Disorder (MDD) have been found to be less skillful in their selection of emotion regulation strategies (Liu & Thompson, 2017). In particular, researchers have identified that individuals with depressive symptoms report increased use of dampening of positive emotions compared to individuals without these same symptoms (Eisner, Johnson, & Carver, 2009; Feldman et al., 2008; Raes, Smets, Nelis, & Schoos, 2012). Importantly, using such strategies been linked to the maintenance of depressive symptoms (Feldman et al., 2008). There is also evidence that individuals with depression are less likely to

savour the positive emotions that they are currently experiencing (Eisner et al., 2009) as well as past ("reminiscing") and future ("anticipating") positive events (Bryant, 2003). Furthermore, individuals diagnosed with major depressive disorder have been found to be more likely to suppress their positive emotions when compared to individuals without the disorder (Beblo et al., 2011). A similar study was conducted by Beblo and colleagues (2013), which included 60 participants (30 with BPD and 30 control participants with 23 females in each group). The authors found that patients with borderline personality disorder have been found to engage in increased suppression of their positive emotions when compared to individuals without this diagnosis. It is estimated that 38% of individuals with depression (Rosenbaum Asarnow et al., 2011) and between 65-80% of individuals with borderline personality disorder (Clarkin, Widiger, Frances, Hurt, & Gilmore, 1983; Soloff et al., 1994) report having engaged in NSSI. While not all individuals that suffer from symptoms of depression or borderline personality disorder will engage in NSSI, these studies provide us with a glimpse into the potential deficits of the regulation of positive emotions in those with a history of NSSI.

Therefore, this study sought to investigate the relations between negative as well as positive emotional dysregulation, the different strategies used to regulate negative and positive emotions, and individuals' engagement in NSSI. Only female participants were included in this study due to the limited number of males who were willing to participate. The first objective was to see if differences exist in self-reports of regulation of negative and positive emotions between females with and without a history of NSSI engagement (in past two years). Specifically, it was hypothesized that females with a history of NSSI engagement would report less effective regulation of negative (H1) and positive emotions (H2) than those without a history of NSSI. The second objective was to, within each group (NSSI and non-NSSI), compare the

frequency of endorsement of healthy versus unhealthy coping strategies for different negative and positive emotions. Given the exploratory nature of this analysis, no hypotheses were made. Finally, the third objective was to compare the frequency of endorsement of healthy versus unhealthy coping strategies to deal with negative and positive emotions between females with and without a history of NSSI. It was hypothesized that females with a history of NSSI engagement would report a proportionately greater frequency of endorsement of unhealthy coping strategies than individuals without a history of NSSI for both negative (H3) and positive (H4) emotions.

Method

Participants

Participants were 95 female university students who reported engaging in NSSI over the past 2 years (*M*age = 20.27; *SD* = 1.65) as well as 95 female university students without a history of NSSI engagement (*M*age = 20.43; *SD* = 1.77). The majority of participants reported their ethnicity as Caucasian (56.3%), followed by Asian (29.5%), other (7.9%) or mixed (6.3%). Of those with a history of NSSI engagement over the past 2 years, 5.3% reported having engaged in NSSI once, 5.3% reported two to four times, 12.6% reported five to 10 times, 45.3% reported 11 to 50 times, 10.5% reported 51 to 100 times, and 21.1% reported over 100 times.

Measures

NSSI screening questionnaire. The Stress and Coping Questionnaire is a self-report questionnaire developed by the Heath Research Team to assess stress and coping in a university sample while also providing preliminary screening information for self-injury. Each statement on the questionnaire assesses the use of both healthy and unhealthy coping behaviours in an individual's lifetime and in the past 12 months. In addition, the questionnaire identifies whether

individuals have used each healthy and unhealthy behaviour to cope with stress. NSSI is included as one of the listed behaviours ("physically hurt myself on purpose without wanting to die"). This item was used to provide preliminary information to identify individuals who may be currently engaging in self-injury as well as anyone who may have engaged in this behaviour in the past from the larger sample.

Non-suicidal self-injury. The Inventory of Statements about Self-Injury (ISAS; Klonsky & Glenn, 2009) is a self-report measure that assesses various aspects of non-suicidal self-injury (NSSI). The ISAS is broken up into two sections related to the frequency and the functions of NSSI. For the purpose of this study, only information pertaining to the frequency of NSSI was used. The first section of the ISAS assesses the lifetime frequency of 12 different NSSI behaviours performed "intentionally (i.e., on purpose) and without suicidal intent," (i.e., banging/hitting body parts, biting, burning, carving, cutting, interfering with wound healing, sticking self with needles, pinching, pulling hair, rubbing skin against rough surfaces, severe scratching, and swallowing dangerous chemicals). In addition, the questionnaire assesses descriptive features of NSSI including the age of NSSI onset, date of most recent NSSI episode, the experience of physical pain during NSSI, the time between the initial urge to self-injure and the NSSI act, and the tendency to self-injure while alone. The ISAS has demonstrated excellent internal consistency (Cronbach's α for interpersonal and intrapersonal scales were .88 and .80, respectively), concurrent validity, and adequate test-retest reliability (Glenn & Klonsky, 2011; Klonsky & Glenn, 2009) for the reporting of NSSI frequency. This measure was used to identify individuals who have ever engaged in NSSI as well as to identify the frequency of NSSI.

Emotion dysregulation. The Regulatory Emotional Self-Efficacy scale (RESE; Carparara & Gerbino, 2001) is a 12-item self-report measure designed to assess one's efficacy in

emotion regulation of negative (despondency and anger) and positive affect. With respect to psychometric properties, the RESE was found to have adequate convergent and divergent validity (Caprara, Guita, Eisenberg, Gerbino, Pastorelli, & Tramontano, 2008; Totan, 2012). In the present study, Cronbach's α was .75 for positive emotions, .79 for despondency, and .75 for anger.

Emotion regulation strategies. The Emotion Regulation Profile - Revised (ERP-R; Nelis et al., 2011) assesses the use of emotion regulation strategies for both negative and positive emotions. This measure describes 16 scenarios intended to evoke a specific discrete negative and positive emotions (e.g., anger, shame, joy) and each of the scenario includes eight response choices representing different regulatory strategies. Half of the response choices describe functional emotion regulation strategies (e.g., positive reappraisal, emotion expression, savouring, capitalizing) while the other half describes dysfunctional emotion regulation strategies (e.g., rumination, acting out, inhibition of emotional expression, fault finding). On the measure used, there are a total of six questions measuring positive emotions and ten questions measuring negative emotions. Individuals completing the questionnaire are instructed to read each of the situations and select the one response that most closely matches the way they would respond to a similar situation in real life. Their response was either a healthy or an unhealthy strategy, as the focus of the current study was the most commonly endorsed strategy as opposed to the variation of strategies used. Validation of the measure demonstrated that the reliability of the global ERP-R score is good (α = .84), with down-regulation of negative emotions and up-regulation of positive emotions showing internal consistencies (Cronbach α's) of .83 and .79, respectively. The measure was also previously found to have adequate convergent and divergent validity.

Procedure

Participants were recruited in two ways. First, participants were recruited from a research team database of individuals who had agreed to be contacted to participate in future studies of stress and coping and had also completed an early screening pertaining to their self-injury engagement.

Participants were also recruited from an ad posted on the McGill Classifieds and social media. The study was advertised as a study investigating the emotion regulation of negative and positive emotions. Participants were sent an e-mail invitation briefly describing the study, and they were given a link to the online study hosted on LimeSurvey as well as a participant ID. Upon accessing this link, participants viewed an informed consent page at the beginning of the online survey, which stated that all information collected would remain confidential. The participants were also informed that they were free to withdraw from the study at any time without penalty.

The online survey consisted of the set of questionnaires described in the methods section of this manuscript. Participants started by completing the Stress and Coping Questionnaire. Individuals who reported that they had engaged in NSSI in their lifetime, were given the ISAS to complete. Those who indicated that the last time they had engaged in NSSI was in the last two years (dated from the day they filled out the survey), were included in the sample. All participants were given the RESE and the ERS to complete. Following completion of the survey, each participant was sent an email which included the necessary debriefing information and received $10 as well a list of resources should they require additional support. The data was then coded and entered into a database, and no identifiable information was available through database access alone.

Results

Before running the main analyses, data cleaning was conducted separately within two groups based on participants' history of NSSI engagement. Given that less than 5% of missing data were found within each group, the data were assumed to be missing completely at random and the Expectation Maximization procedure was used to impute missing values. No violations of normality were found other than one univariate outlier in the NSSI group who was removed from subsequent analyses. No multivariate outliers were identified. Therefore, the final sample consisted of 95 female university students who reported engaging in NSSI over the past 2 years (*M*age = 20.27; *SD* = 1.65) and a comparison group of 95 female university students without a history of NSSI engagement (*M*age = 20.43; *SD* = 1.77).

For the first objective, a one-way MANOVA was conducted to examine group differences between individuals with and without a history of NSSI engagement in terms of self-report of regulation of negative and positive emotions. Table 2 shows the means and standard deviations of the emotion regulation subscales organized by NSSI group (NSSI and non-NSSI). As hypothesized (H1), results revealed significantly lower emotion regulation for negative emotions overall in individuals with a history of NSSI engagement in the past two years compared to those without, F (187, 2) = 11.50, $p < .001$, partial $\eta^2 = .11$. Specifically, main effects were found both for the negative emotions of despair, F (188, 1) = 184.05, $p < .001$, partial $\eta^2 = .09$, and anger, F (188, 1) = 174.34, $p < .001$, partial $\eta^2 = .08$. Similarly, results from a one-way ANOVA also supported the second hypothesis (H2). Individuals with a history of NSSI engagement in the past two years reported significantly less emotion regulation of positive emotion than those without, F (188, 1) = 7.63, $p = .006$, partial $\eta^2 = .04$

The second objective sought to compare the frequency of endorsement of healthy versus unhealthy coping strategies between a number of negative and positive emotions within the NSSI and non-NSSI groups. Cochran's *Q* test (Cochran, 1950) was conducted for each NSSI and non-NSSI groups to determine if the percentage of participants endorsing unhealthy strategy use on the *Emotion Regulation Profile - Revised* differed between the types of negative emotions (anger, shame, sadness) and positive emotions (joy, excitement, contentment). Within each group, the sample size was appropriate to use the chi-square distribution approximation (Tate & Brown, 1970). As demonstrated in Table 1, the percentage of participants endorsing unhealthy strategy use was significantly different between the specific emotions within both the NSSI group, $\chi^2(5) = 66.81$, $p < .001$, and the non-NSSI group, $\chi^2(5) = 85.58$, $p < .001$. Pairwise comparisons were conducted using Dunn's (1964) procedure with the Bonferroni correction and revealed similar patterns for both NSSI and non-NSSI groups. Specifically, unhealthy strategy use did not differ between any of the positive emotions (i.e., joy, excitement, and contentment). Similarly, the percentage of unhealthy strategy use was not significantly different between any of the negative emotions (i.e., anger, shame, sadness). When comparing negative and positive emotions, the percentage of unhealthy strategy use was significantly higher for both anger and shame compared to all positive emotions. Although there was a slight significant increase in the percentage of unhealthy strategy use for sadness compared to both joy (NSSI: $p = .008$; non-NSSI: $p = .002$) and excitement (NSSI: $p < .001$; non-NSSI: $p = .004$), no significant differences were found between sadness and contentment.

Finally, the third objective was to compare the frequency of endorsement of healthy versus unhealthy coping strategies to deal with negative and positive emotions between the NSSI and non-NSSI groups. Chi-square tests of independence were conducted between NSSI groups

(NSSI/non-NSSI) and endorsement of coping strategies (healthy/unhealthy) across specific emotions (negative emotions: anger, shame, sadness; positive emotions: joy, excitement, contentment). All expected cell frequencies were greater than five. As described below and presented in Figure 1 and in Table 3, significant associations between NSSI group and non-NSSI endorsement of coping strategies were found for each type of emotion.

Overall, as hypothesized (H3 and H4), when comparing observed to expected counts, individuals with a history of NSSI reported proportionally less healthy and more unhealthy coping strategies than expected while the opposite pattern was found within the non-NSSI group across all types of emotions. Specifically, for anger and shame, although individuals in both the NSSI and non-NSSI groups tended to report a greater frequency of unhealthy coping strategy use than healthy, those in the NSSI group reported proportionately less healthy coping and more unhealthy coping relative to those in the non-NSSI group. A different pattern emerged for sadness, whereby individuals in the NSSI group still reported less healthy than unhealthy strategy use while those in the non-NSSI group reported more healthy than unhealthy strategy use. In terms of positive emotions, although individuals in both the NSSI and non-NSSI groups tended to report a greater frequency of healthy coping strategy use than unhealthy, individuals in the NSSI group reported proportionately less healthy than expected and more unhealthy than expected for all three types of positive emotions (joy, excitement, and contentment).

Discussion

The present study investigated the role of positive and negative emotion regulation in female university students who engage in NSSI. Specifically, the research objectives were to examine whether young female adults who report having engaged in NSSI over the past two years significantly differ from those with no history of NSSI on reported levels of emotion

regulation of (a) negative emotions and (b) positive emotions. Secondly, healthy and unhealthy strategy use across negative and positive emotions was looked at within the NSSI and the non-NSSI groups. Furthermore, a third objective was to compare the strategies used across groups (NSSI and non-NSSI) by the valence of emotion (negative and positive).

With regards to the relation between negative emotional regulation and NSSI, it was hypothesized that engagement in NSSI would be related to significant difficulties in negative emotional regulation. In support of our first hypothesis, groups with and without a history of NSSI significantly differed, in that individuals with a history of engaging in NSSI in the past two years reported substantially lower levels of regulation when experiencing negative emotions compared to individuals who had never engaged in NSSI. These findings were unsurprising given that many researchers have already confirmed that individuals who engage in NSSI have particular difficulty regulating their negative emotions (e.g., Chapman, 2006; Kiekens et al., 2017; Klonsky, 2007, 2009; Nock, 2009; Somma, Sharp, Borroni, & Fossati, 2017; Zelkowitz, Porter, Heiman, & Cole, 2017). However, interestingly, when looking at the role of the regulation of positive emotions and NSSI, an area requiring further exploration, our hypothesis was also supported. As expected, individuals with a history of NSSI reported significantly lower levels of regulation of their positive emotions.

These results are noteworthy as there are no studies to date in the NSSI research which evaluate the regulation of positive emotions. However, the current findings that examine positive emotion regulation difficulties in females with a history of NSSI are consistent with findings of research conducted in other populations with known difficulties regulating their negative and positive emotions, particularly depression and borderline personality disorder (e.g., Bryant, 2003; Eisner et al., 2009; Beblo et al., 2011; Beblo et al., 2013). These results are also

interesting as they show that while individuals with a history of engaging in NSSI may experience fewer positive emotions (Victor and Klonsky), these individuals are better at regulating their positive emotions than their negative emotions. According to the depression literature, it has been suggested that individuals recovering from depression may both actively avoid (Hayes & Feldman, 2004) and assume they are not entitled to positive affective experiences (Beblo et al., 2013). While these results highlight the perceived difficulties in regulating emotions for individuals who engage in NSSI, it is also important to understand the types of strategies individuals employ when trying to cope with their negative and positive emotions.

When looking at the endorsement of unhealthy regulation strategies that individuals endorse for different emotions (both negative and positive) within each group, no hypothesis was originally formulated due to the exploratory nature of this study. The results show that individuals, regardless of whether they recently engaged in NSSI, demonstrate a similar pattern of strategy use across different negative and positive emotions. This study is the first to compare the profiles of strategies used across emotions within groups of individuals with and without NSSI.

As a whole, all individuals were found to use significantly more unhealthy strategies when coping with negative emotions than when coping with positive emotions. These results are consistent with the results identified by Nelis and colleagues (2011) who found, with the Emotion Regulation Profile - Revised (ERP-R), that females are better at regulating their positive emotions than their negative emotions. These results are also consistent with research that aims to understand how effective females are at regulating their negative emotions. For example, McRae and colleagues (2008) found that females were less efficient in regulating their negative

emotions than their male counterparts. In the present study the absence of male peers for comparison limits our ability to interpret the current findings.

When looking more specifically at how the emotions compare to one another, each of the distinct emotions were not found to be different from the other emotions of the same valence. Interestingly, although the positive valence emotions significantly differed from the negative valence emotions, a different pattern emerged for contentment (a positive valence emotion) and sadness (a negative valence emotion). More specifically, while contentment and sadness, emotions from opposite valences, were not found to be different from one another, they were different from the other emotions of the opposite valence. It is possible that these results are because people more commonly experience these two emotions (sadness and contentment) and as a result, they are not as difficult to cope with as the emotions found to be on the extremes. While no research has been done to explore the regulation of contentment, there is some research to support the notion that sadness is an emotion that is easier to cope with compared to others. In particular, researchers have found that sadness is considered to be more tolerable by individuals and may require less allocation of resources for regulation (Blanchard-Fields & Heckman, 2008; Bonanno, 2001; Consedine et al., 2002; Cooper & Faragher, 1993). It is also possible that participants' appraisal of the situation chosen for the emotion of sadness played a role in these results.

While the two groups demonstrate the same pattern of regulation across different emotions, it is also important to understand if differences exist between the two groups and their use of regulation strategies for each of the different emotions investigated. The present study adds an important piece of information to the literature regarding the regulation of emotions in individuals who engage in NSSI, particularly in terms of how individuals who engage in NSSI

compare to those who do not engage in such behaviour on their strategy use across negative and positive emotions.

When we look more specifically at the differences between the groups, it is apparent that individuals who engage in NSSI use significantly more unhealthy and less healthy strategies than individuals who have not engaged in NSSI, across all emotions. With respect to negative emotions, individuals with a history of NSSI use less healthy coping and more unhealthy coping than those in the non-NSSI group. These results are consistent with previous studies looking at how individuals who engage in NSSI have used unhealthy strategies to cope with their negative emotions (e.g., Andrews et al., 2013; Gratz & Roemer, 2008; Richmond et al., 2015). Interestingly, the group without a history of NSSI reported using more healthy strategies than unhealthy strategies in the face of sadness. It is possible that these results are related to the above-mentioned findings that sadness is considered to be more tolerable for individuals and may require less allocation of resources for regulation (Blanchard-Fields & Heckman, 2008; Bonanno, 2001; Consedine et al., 2002; Cooper & Faragher, 1993). While sadness may be easier to cope with than other negative emotions, those with a history of NSSI still use more unhealthy strategies when faced with this emotion.

In contrast, when looking at positive emotions, even though individuals are more likely to use healthy strategies than unhealthy strategies across positive emotions, group differences also exist. Specifically, individuals who engage in NSSI use significantly less healthy strategies and more unhealthy strategies than their peers who do not engage in the NSSI. In other words, while they are still using more healthy than unheathly strategies to regulate positive emotions, individuals who have engaged in NSSI are not as good at regulating their positive emotions as their non-NSSI peers. These results are consistent with the literature in the area of depression

and borderline personality disorder; notably, that individuals with poor emotion regulation abilities use more unhealthy and less healthy strategies than individuals without such difficulties (Beblo et al., 2011, 2013; Eisner et al., 2009; Feldman et al., 2008; Raes et al., 2012). For example, Beblo and colleagues (2013) found that individuals with borderline personality disorder were more likely than individuals without this disorder to suppress their positive emotions. Overall, it appears that individuals who engage in NSSI are better at regulating their positive emotions than their negative emotions; however, they are not as effective at doing this than their non-NSSI peers.

Based on these results it appears that there may be in fact two ways of improving the downregulation of emotions in individuals who engage in NSSI. Clinically, one way would be to work on the use of healthy strategies for negative emotions. More specifically, this can be done by targeting the negative emotions (e.g., anger, shame) that are particularly difficult for individuals who engage in NSSI to regulate and coaching them through more healthy ways of coping. In practice, this can be done using Dialectical Behavioural Therapy (DBT; Linehan, 1993) as a therapeutic approach. This approach has been found to be useful for individuals with emotion regulation difficulties and poor distress tolerance (Miller, Wyman, Huppert, Glassman, & Rathus, 2000; Pistorello, Fruzzetti, MacLane, Gallop, & Iverson, 2012; Stanley, Brodsky, Nelson, & Duilt, 2007). More specifically, using the four modules, including mindfulness, distress tolerance, emotion regulation, and interpersonal relationships components of this therapeutic modality, individuals can significantly improve their regulation in challenging situations.

Furthermore, this study provides empirical support in line with the broaden-and-build theory, that positive emotions also merit attention. In particular, it could be clinically relevant to

focus on the up-regulation of positive emotions when working with females, particularly those who engage in self-injury. Joiner and colleagues (2001) suggest that the positive emotions evoked in the therapy environment could even be used to help individuals be open to learn new skills. These skills could then be generalized to everyday life (Morris, Simpson, Sampson, & Beesley, 2013). Focusing on positive emotions can be done in the clinical setting using the same processes of DBT that would be used for negative emotions. However, to do this, professionals will need to spend part of their sessions focusing on situations where individuals are faced with situations that evoke positive emotions and in which strategies will be used to cope in such situations.

While the present study puts forward several findings that advance the understanding of emotion regulation of negative and positive emotions in individuals with a history of engaging in NSSI, the study has several limitations. Firstly, the present study is limited to female university students, excluding males and young adults with and without a history of NSSI outside the university setting. The inclusion of males and non-university students in such studies would be important to adequately represent young adults who engage in NSSI. Secondly, the results of this study were based entirely on self-report information. Future studies may want to use experimental methods to investigate the relationship between emotional regulation of both negative and positive emotions in individuals with a history of engaging in NSSI. Furthermore, our study limited one response for strategy use. This was done in order to single out each individuals' preference in strategy. However, future studies may seek to allow participants to select multiple responses, in order to see if the same results are reproduced.

Conclusion

Previous research has established that the regulation of negative emotions was primarily responsible for putting individuals at risk of engaging in NSSI due to its effectiveness in temporarily reducing the experience of negative affect. Rather, the current findings suggest that individuals' emotion regulation skills of both negative and positive emotions play an important role in NSSI. In particular, individuals, regardless of their history of NSSI, show the same overall pattern in the way that they use unhealthy strategies to regulate their emotions. When we look at differences between the groups, individuals who engage in self-injury have more difficulty regulating their emotions, regardless of valence, than their peers who do not engage in NSSI; however, they still tend to use more healthy strategies to cope with positive emotions and more unhealthy strategies to cope with negative emotions. In line with the broaden-and-build theory (Fredrickson, 1998, 2001), focusing on increasing the experience of positive emotions could, in turn, improve our ability to regulate negative emotions. Thus, the results of this study may have implications for the clinical treatment of individuals who engage in NSSI, specifically concerning the possible benefits of working on their ability to up regulate their positive emotions.

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Table 1.

Means and Standard Deviations for Emotion Regulation scores of Negative and Positive Emotions for Participants With and Without a History of NSSI Engagement

	NSSI (*n* = 95)		**Non-NSSI** (*n* = 95)	
	M	***SD***	***M***	***SD***
Despondency	4.58	2.84	6.55	3.28
Anger	5.56	3.02	7.47	3.39
Positive emotions	9.84	3.53	11.19	3.18

Table 2.
Frequency of Healthy and Unhealthy Coping Strategy Use for Negative and Positive Emotions in Both NSSI and Non-NSSI Groups and Pairwise Comparisons Across Emotions

	NSSI (*n* = 93)		**Non-NSSI (*n* = 93)**	
	% Healthy	**% Unhealthy**	**% Healthy**	**% Unhealthy**
Anger	25.8	74.2[a]	41.9	58.1[a]
Shame	30.1	69.9[a]	45.2	54.8[a]
Sadness	37.6	62.4[a, c]	60.2	39.8[a, c]
Contentment	55.9	44.1[b, c]	75.3	24.7[b, c]
Joy	62.4	37.6[b]	84.9	15.1[b]
Excitement	71.0	29.0[b]	83.9	16.1[b]

Note. Significant differences in healthy strategy use between emotions within each group (NSSI and non-NSSI), as found using pairwise comparisons in Cochran's *Q* test, are indicated by superscript letters within the unhealthy column. Emotions with the same superscript letter are not significantly different from one another in terms of unhealthy strategy use.

Table 3.

Results from Chi Square Tests Comparing Healthy and Unhealthy Strategy Use Across NSSI and Non-NSSI Groups Within Positive and Negative Emotions

	NSSI							**Non-NSSI**						
	n	**Healthy**			**Unhealthy**			***n***	**Healthy**			**Unhealthy**		
		O	***E***	**% of group**	***O***	***E***	**% of group**		***O***	***E***	**% of group**	***O***	***E***	**% of group**
Anger	94	24	32	25.5	70	62	74.5	94	40	32	42.6	54	62	57.4
Shame	94	28	35.5	29.8	66	58.5	70.2	94	43	35.5	45.7	51	58.5	54.3
Sadness	93	35	45.8	37.6	58	47.2	62.4	94	57	46.2	60.6	37	47.8	39.4
Contentment	94	52	61.5	55.3	42	32.5	44.7	94	71	61.5	75.5	23	32.5	24.5
Joy	94	58	69	61.7	36	25	38.3	94	80	69	85.1	14	25	14.9
Excitement	94	67	72.9	71.3	27	21.1	28.7	93	78	72.1	83.9	15	20.9	16.1

Note. O = Observed value; *E* = Expected value. "% of group" indicates the percentage of participants within either the NSSI or non-NSSI groups who reported healthy or unhealthy strategy use for each emotion.

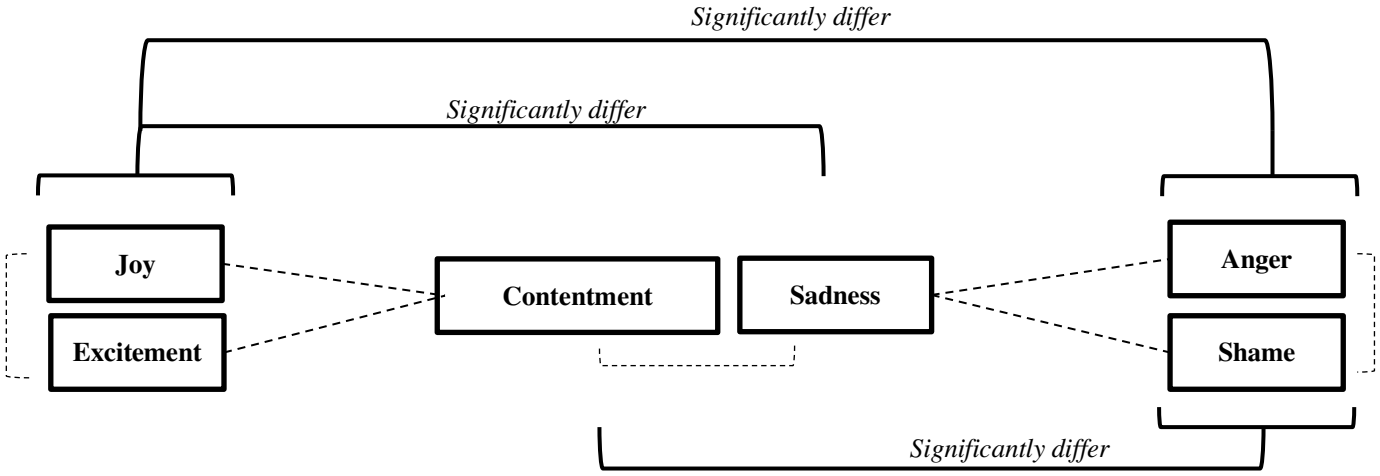

Figure 1. Patterns of significant (full lines) and non-significant (dashed lines) differences as a result of Cochran's *Q* test when comparing unhealthy strategy use across different positive (i.e., joy, excitement, contentment) and negative (i.e., sadness, anger, shame) emotions within both the NSSI and non-NSSI groups.

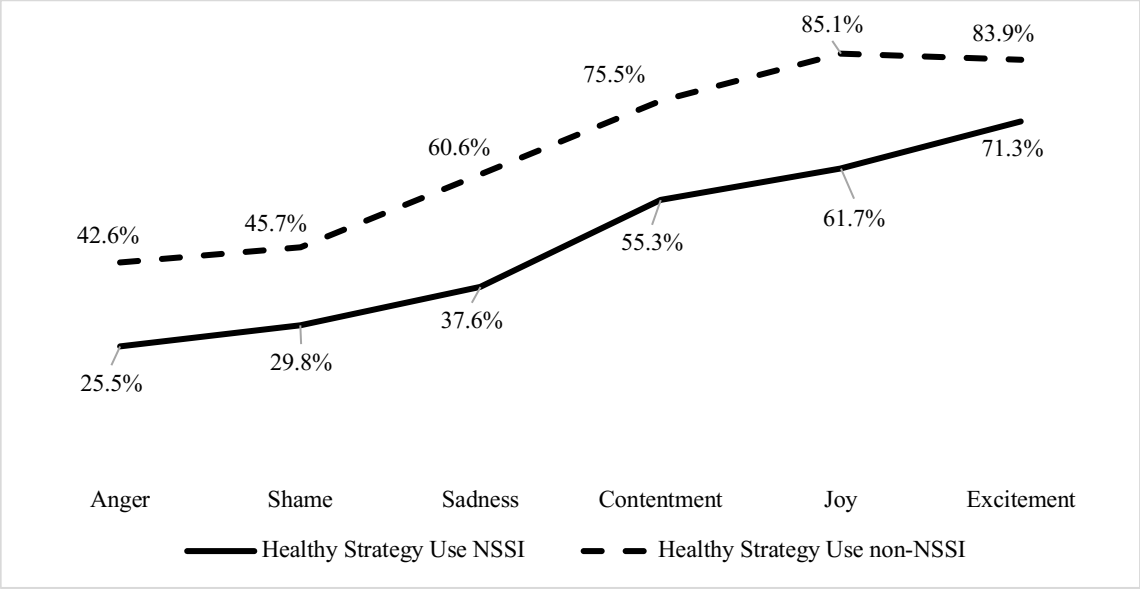

Figure 2a. Frequency of use of healthy strategies for negative and positive emotions for individuals with and without a history of NSSI.

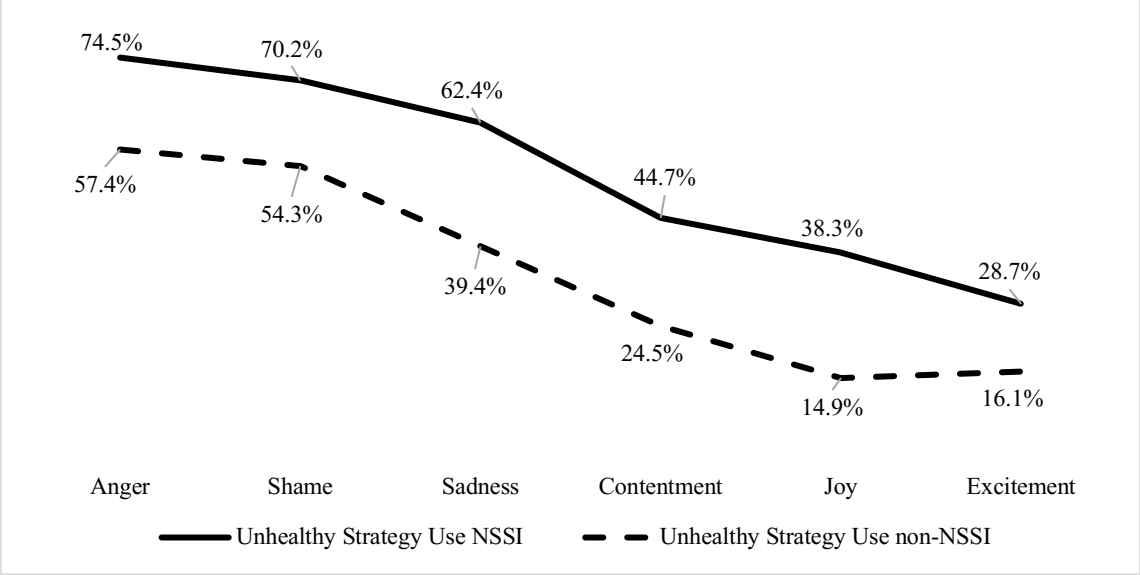

Figure 2b. Frequency of use of unhealthy strategies for negative and positive emotions for individuals with and without a history of NSSI.

Bridging Manuscripts

The second objective of this dissertation was to investigate the emotion regulation of negative and positive emotions in individuals who have a history of NSSI. This was done using the basis of the broaden-and-build theory (Fredrickson, 1998, 2001), which posits that the experience of positive emotions will increase an individual's ability to skillfully regulate their negative emotions. As previously noted, the findings in Manuscript 1 supported the differences in emotional reactivity in individuals with and without a history of NSSI. However, no differences were found in regard to the reactivity of positive emotions. Next, results of Manuscript 2 provide support for the dysregulation of both negative and positive emotions in individuals with a history of NSSI. Interestingly, females with and without a history of NSSI demonstrate the same pattern of strategy use across different negative and positive emotions. In particular, female university students, regardless of their engagement in NSSI, were found to use more unhealthy and less healthy strategies in the face of negative emotions. Furthermore, when comparing group differences specifically, individuals who engage in NSSI used significantly more unhealthy and less healthy strategies for negative emotions than individuals who have not recently engaged in NSSI. While individuals are more likely to use healthy strategies than unhealthy strategies across positive emotions, group differences also exist. In particular, individuals who engage in NSSI use significantly less healthy strategies and more unhealthy strategies than their peers who do not engage in the same behaviour. The results of Manuscripts 1 and 2 suggest that the reactivity of negative emotions, particularly the persistence of such emotions, and emotional regulation (negative and positive) play an important role in NSSI. These findings suggest that there are differences in the regulation of positive emotions when looking at self-report measures of general tendencies. However, no studies have looked at

whether the same differences are found when participants are required to rate their emotional responses (negative and positive) to a present and standardized stimulus of both valences. Thus, the next step in this line of inquiry is to compare individuals' self-report measures, which are general estimates of difficulties, with results from a standardized mood inducement procedure.

CHAPTER 4

MANUSCRIPT 3

Emotional Reactivity, Emotional Regulation, and NSSI: Is it Accurately Perceived?

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Abstract

Non-suicidal self-injury (NSSI) has consistently been associated with reports of difficulties in emotion reactivity and the regulation of negative emotions (e.g., Gratz & Roemer, 2004; Nock et al., 2008); less is known about reactivity and regulation of positive emotions. The present study sought to investigate differences between individuals with and without a history of NSSI for both negative and positive emotions for: (a) self-reported general tendencies of emotional reactivity, (b) self-reported general tendencies of emotional regulation, and (c) self-reported emotions in response to a positive and a negative mood induction. The sample consisted of 36 females (*M*age = 20.06; *SD* = 1.51) with a recent history of NSSI within last two years and a female comparison group with no history of self-injury (*n* = 34; *M*age = 20.15; *SD* = 1.54). Participants completed self-report measures of negative and positive emotion reactivity and regulation. In a separate session, participants also underwent a negative and positive emotions inducement using a counterbalanced design, and their experienced emotions were assessed. Results from separate two-way MANOVAs and ANOVAs revealed the group with a history of NSSI reported significantly greater difficulties in negative emotional reactivity and regulation than the comparison group (without the same NSSI history); however, no group differences emerged in self-reported of reactivity or regulation of positive emotions. In contrast, repeated measures ANOVAs on data from the emotion inducement task found no group differences in reactivity or regulation for either negative and positive emotions. These findings highlight the possibility that although individuals who recently engaged in NSSI evaluate their ability to manage negative emotions as significantly worse than individuals with no history of self-injury, this may not reflect their actual emotion regulatory processes.

Emotional Reactivity, Emotional Regulation and NSSI: Is it Accurately Perceived?

Non-suicidal self-injury (NSSI), the deliberate damaging of body tissue without the intent to die and for purposes not socially sanctioned (American Psychiatric Association, 2013; International Society for the Study of Self-Injury, 2007) has been associated with high levels of reactivity to negative emotions (Gratz, 2003; Gratz & Roemer, 2008; Jenkins & Schmitz, 2012; Kleiman, Ammerman, Look, Berman, & McCloskey, 2014; Linehan, 1993; Smith, Hayes, Styer, & Washburn, 2017). In contrast, some studies have found no differences in emotional reactivity when comparing individuals with a history of NSSI to those without (Gratz, 2003; Gratz & Chapman, 2007; Zelkowitz, Cole, Han, & Tomarken, 2016).

Furthermore, research is consistent in suggesting individuals with a history of engaging in NSSI have difficulties regulating their negative emotions (e.g., Andrews et al., 2013; Armey & Crowther, 2008; Gratz & Roemer, 2008; Hasking, Moment, Swannell, & Chia, 2008; Heath et al., 2008; Hoff & Muehlenkamp, 2009; Najmi et al., 2007; Nicolai, Wielgus, & Mezulis, 2015; Richmond, Hasking, & Meany, 2015; Zelkowitz et al., 2017). Much of the research that investigates emotional reactivity and regulation among individuals with a history of NSSI has been conducted through self-report or diary studies (e.g., Adrian et al., 2011; Gratz & Roemer, 2004; Victor & Klonsky, 2014). Typically, in diary studies participants indicate their emotions and their experience of such emotions as soon as they are able to do so following a distressing or difficult event. In self-report studies, individuals typically respond to questions based on their interpretation of general tendencies. However, these studies very rarely evaluate emotions as the individual is experiencing them.

More recently, researchers have begun to better understand the role of positive emotions in NSSI. Victor and Klonsky (2014) conducted a study in which they asked 84 university

students with and without a history of engaging in NSSI to complete daily diaries as well as measures that assess general tendencies of individuals' emotional experiences. The results of their study revealed that, compared to individuals without a history of NSSI, participants who had engaged in NSSI in the past 6 months reported experiencing significantly increased negative affect and fewer instances of positive emotions. Victor and Klonsky's study (2014) was the first to look at the experience of positive emotions in individuals who report having ever engaged in NSSI. Not only does this study highlight the importance of investigating positive emotions in this population but it also accentuates that there may be significant differences between negative and positive emotions in this population. Furthermore, Burke and colleagues (2015) found that individuals who had a history of engaging in NSSI were more likely than those without the same history to use brooding and dampening towards their negative and positive emotions.

Furthermore, there have been a number of studies that examined the use of positive emotion regulation strategies in individuals suffering from symptoms of depression and borderline personality disorder (BPD) (e.g., Beblo et al., 2011, 2013; Bryant, 2003; Eisner, Johnson, & Carver, 2009), two populations with known emotion dysregulation and engagement in NSSI (e.g., Glenn & Klonsky, 2009; Rosenbaum Asarnow et al., 2011). Researchers have found that individuals with depressive symptoms report increased use of unhealthy strategies, such as dampening of positive emotions compared to individuals without these same symptoms (Eisner et al., 2009; Feldman, Joormann, & Johnson, 2008; Raes, Smets, Nelis, & Schoos, 2012). These individuals have also been found to be less likely to savour the positive emotions that they are currently experiencing (Eisner et al., 2009). Beblo and colleagues (2013) found that patients with borderline personality disorder have been found to engage in increased suppression of their positive emotions when compared to individuals without this diagnosis.

In two studies, the emotional reactivity and regulation of negative and positive emotions in individuals with a history of NSSI were examined (Stern, Mettler, & Heath, 2018a; 2018b). The two studies involved the same sample of participants. The first study included a total of 192 female university students. 96 participants reported having engaged in NSSI in the past two years. The other 96 participants constituted an age-matched control group without a history of NSSI. The ERS (Nock, Wedig, Holmberg, & Hooley, 2008) questionnaire was used to measure emotional reactivity. The questions assessing emotional reactivity of negative emotions were altered to reflect the reactivity of positive emotions (sensitivity, arousal/intensity, and emotional persistence). Individuals who reported having engaged in NSSI did not show differences in their reactivity of positive emotions when compared to individuals who do not engage in this behaviour. The authors did, however, find significant differences in the reactivity (sensitivity, arousal/intensity, and emotional persistence) of negative emotions. More specifically, individuals with a history of self-injury were found to have higher levels of reactivity than the comparison group. The second study included 190 female university students (50% NSSI) and aimed to determine the presence and nature of emotion regulation differences between individuals with and without a history of NSSI. Their results revealed that individuals who had reported engaging in NSSI in the past two years had higher levels of dysregulation related to both their negative and positive emotions. Those with a history of NSSI were also found to use significantly more unhealthy regulation strategies (e.g., rumination, inhibition of expressed emotions, inattention, fault finding) than their peers without the same history in both positive and negative situations.

When investigating emotional processes, researchers in the field of NSSI have moved towards investigating individuals' current mood state in order to identify whether differences

exist in the emotional experiences of those with and without a history of NSSI. Mood induction studies provide researchers with the opportunity to assess participants' emotions in real time as well as manipulate the environment to elicit a desired emotion (Kučera & Haviger, 2012). There have already been several mood induction experimental designs that have been conducted with individuals with a history of engaging in NSSI (e.g., Arbuthnott, Lewis, & Bailey, 2014; Bresin & Gordon, 2013; Weinberg & Klonsky, 2012). These studies have used a variety of stimuli to induce emotions in participants, including showing emotional photos, videos, or having participants think of a personal situation that is linked with a specific emotion.

Davis and colleagues (2014) conducted two studies in order to better understand emotional reactivity among adults with a history of NSSI. Their first study included a total of 148 participants between the ages of 23 and 60 (57.4% male). Twenty-five participants reported having engaged in NSSI. There were two control groups in this study that were matched on mean level of age, sex, race, education, income, and intelligence. The first control group included 37 participants with low anxiety and depressive symptoms, as well as no history of NSSI. A second control group of 49 participants was included in this study and comprised individuals matched to the group with a history of NSSI on mean levels of anxiety and depression, but without having a history of self-injury. Participants were asked to watch a sad video clip (a scene from the movie *Fatal Attraction*) and report their experience of negative emotions (i.e., sadness, anger, anxiety, contempt, frustration, fear, hopelessness, loneliness, guilt, embarrassment, and shame). Davis and colleagues' (2014) study described above did not find differences in reports of negative emotion reactivity between the three groups. This is possibly due to the participants' familiarity with the movie. However, the NSSI group did exhibit a lower ability to regulate their negative emotions with appraisal (a healthy strategy). In a second study

described in the same paper, Davis and colleagues (2014) used fMIR analyses to measure individuals' brain activation of the amygdala when they were presented with a series of negative images. The sample included 48 female participants between the ages of 19 and 35 years old, with 21 participants reporting a history of NSSI. According to their results, individuals with a history of self-injury did not show greater reactivity of their negative emotions (based on activation in the amygdala or in the full brain compared to the control group). However, the NSSI group reported greater activation in the amygdala, medial prefrontal cortex when regulating their negative emotions with reappraisal. As a whole, no differences were found in emotional reactivity between individuals with and without a history of NSSI regardless of the measure used (self-report and neural activation) and the type of stimuli (images or videos); whereas, differences were found in the regulation of negative emotions on both tasks.

In addition, a study by Glenn and colleagues (2011) found different results when looking at individuals' self-report of emotional reactivity and startle measures. Their study included 78 college students, with 41 participants having reported engaging in NSSI (73.2% female) and 37 individuals (62.2% female) with no prior NSSI engagement. Participants were asked to fill out the Emotional Reactivity Scale (ERS; Nock et al., 2008) to assess their general reactivity to negative emotions. In addition, participants were presented with 54 images (18 unpleasant, 18 neutral, and 18 pleasant) for 8 seconds each. The authors also included auditory startle probes in their study, similar to white noise. The startle probes were used to examine defensive reactivity during and after picture viewing. Participants were asked to complete a self-report questionnaire of arousal (on a Likert scale of 1 (extremely aroused) to 9 (extremely calm) and startle-elicited physiological reactions were recorded. While the authors measured arousal, they did not measure individual's emotional reactivity in their mood inducement. Results indicate that

individuals with a history of NSSI self-reported significantly greater emotional reactivity on three levels of the reactivity measured by the ERS: sensitivity, arousal/intensity, and emotional persistence. However, individuals with and without a history of NSSI were found to report similar patterns of arousal for any of the picture types. In addition, no group differences were found when using the physiological measure of startle.

In a study by Arbuthnott and colleagues (2014), researchers induced negative mood in individuals with a history of NSSI and eating disorders in order to examine emotional changes and rumination patterns. The study included 342 university students (79.2% female) between the ages of 17 and 36. 181 participants (140 female and 41 male) reported having engaged in NSSI at least once in their lifetime, while Participants performed a rumination task in which they were asked to think of an upsetting event and write about their feelings related to the incident. Both prior to and pursuant to the task, their state-level negative and positive affect were measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Findings from this study indicated that individuals with a history of NSSI reported significantly greater increases in negative affect during the task when compared to the individuals with eating disorders; whereas, the individuals with an eating disorder reported greater decreases in positive emotions than those with a history of NSSI. Participants who had a history of engaging in NSSI and with an eating disorder reported the greatest change in emotions after engaging in rumination. While participants mood did not get increasingly worse with each presentation of the rumination task, their overall mood stayed low, indicating poor emotional regulation. These results suggest that there are differences in negative and positive emotions in individuals with a history of NSSI following a rumination task. The findings also indicate that the positive emotions of groups of individuals with distinct difficulties (such as those who engage in NSSI

compared to those with an eating disorder) may be affected in different ways by emotional situations.

Overall, very few studies in the NSSI literature have used mood inducement to examine the reactivity and dysregulation of emotions compared to individuals without a history of NSSI. While the studies that have been performed have produced mixed findings, depending on the type of task used, mood inducement procedures provide a way of manipulating the environment to elicit a desired emotion and to assess individuals' current mood state as well as changes in mood. Furthermore, while the research that has measured positive emotions have found differences in affect between individuals with discrete difficulties, no studies to date have included the inducement of positive emotions with this population. Thus, the objectives of the current study were to investigate differences between individuals with and without a history of NSSI engagement for both negative and positive emotions in terms of (a) self-reported general tendencies of emotional reactivity, (b) self-reported general tendencies of emotional regulation, and (c) self-reported experienced emotions in response to positive and negative mood inductions.

For the first objective, it was hypothesized that on the self-report questionnaires, individuals engaging in NSSI will report significantly greater difficulty with emotional reactivity for both negative (H1a, i.e., report greater reactivity to negative emotions) and positive (H1b, i.e., report less reactivity to positive emotions) emotions than the non-NSSI group.

For the second objective, it was hypothesized that on the self-report questionnaires, the NSSI group is expected to report significantly less success in emotion regulation in response to negative (H2a; i.e., less ability to down regulate negative emotions) and positive (H2b; i.e., less ability to up regulate positive emotions) emotions compared to the non-NSSI group.

With regards to the mood induction, mixed results have been found in relation to emotional reactivity and regulation. Based on previous findings by Arbuthnott et al., 2014, it was hypothesized for the third objective that individuals with a history of NSSI will report higher levels of negative affect in response to both the negative (H3a) and positive (H3b) mood inducement than individuals who have never engaged in NSSI. In terms of positive affect, it was hypothesized that individuals with a history of NSSI would report significantly less positive affect than those without a history of NSSI in both the negative (H4a) and positive (H4b) mood inducement. Interactions were also expected such that individuals with a history of NSSI would require significantly more time to recover (i.e., return to baseline) from negative emotions in the negative mood inducement (H5a) and less time to return to baseline from positive emotions in the positive mood inducement (H5b) than individuals in the non-NSSI group.

Method

Participants

Participants were female undergraduate students (N = 74) recruited from a large urban Canadian university. Male participants were not included as there was an insufficient response rate of males expressing interest in the current study. As a result of data cleaning, four participants had to be removed from the study (details are provided in the Result section below); thus, the final sample consisted of 36 female participants who reported engaging in NSSI at some time over the past two years (Mage = 20.06 years; SD = 1.51), as well as a comparison group of 34 female participants with no history of NSSI engagement ($Mage$ = 20.15 years; SD = 1.54). 57.1% of participants reported their ethnicity as Caucasian, followed by 28.6% as Asian, 8.6% as other, and 5.7% as mixed.

Individuals who reported having engaged in NSSI over 2 years ago, were not included in the study. This particular timeframe was chosen to be more inclusive than the current DSM-V criteria, which is limited to engaging in NSSI in the past year (American Psychiatric Association, 2013). With regard to NSSI frequency, 5.6% of participants in the present study reported having engaged in NSSI once, 11.1% reported two to four times, 8.3% reported five to ten times, 50% reported eleven to fifty times, 8.3% reported fifty-one to one-hundred times, and 16.7% reported having engaged in the behavior more than one-hundred times.

Measures

NSSI screening questionnaire. The Stress and Coping Questionnaire is a self-report questionnaire developed by the researchers to assess stress and coping in a university sample while also providing preliminary screening information for self-injury. Each statement on the questionnaire assesses the use of both healthy (e.g., meditation, talking to a friend) and unhealthy coping (e.g., excessive alcohol intake, NSSI) behaviours in an individual's lifetime and in the past 12 months. In addition, the questionnaire identifies whether individuals have used the healthy and unhealthy behaviours to cope with stress or for other reasons. NSSI is included as one of the listed behaviours ("physically hurt myself on purpose without wanting to die"). This item was used to provide preliminary information to identify individuals who may be currently engaging in self-injury as well as anyone who may have engaged in such behaviour in the past from the larger sample.

Non-suicidal self-injury. The Inventory of Statements about Self-Injury (ISAS; Klonsky & Glenn, 2009) is a self-report measure that assesses various aspects of non-suicidal self-injury (NSSI). The ISAS is broken up into two sections related to the frequency and the functions of NSSI. For the purpose of this study, only information relating to the frequency of

NSSI was used. The first section of the ISAS assesses the lifetime frequency of 12 different NSSI behaviours performed "intentionally (i.e., on purpose) and without suicidal intent," (i.e., banging/hitting body parts, biting, burning, carving, cutting, interfering with wound healing, sticking self with needles, pinching, pulling hair, rubbing skin against rough surfaces, severe scratching, and swallowing dangerous chemicals). In addition, the questionnaire assesses descriptive features of NSSI including the age of NSSI onset, date of most recent NSSI episode, number of times having engaged in NSSI, the experience of physical pain during NSSI, the time between the initial urge to self-injure and the NSSI act, and the tendency to self-injure while alone. The ISAS has demonstrated excellent internal consistency (Cronbach's $\alpha = .84$), concurrent validity, and adequate test-retest reliability (Glenn & Klonsky, 2011; Klonsky & Glenn, 2009) for the reporting of NSSI frequency. This measure was only administered to individuals who indicated on the Stress and Coping Questionnaire that they had ever engaged in NSSI in order to specifically identify individuals who had engaged in NSSI over the past two years and to confirm the group membership in the NSSI group.

Emotional reactivity. All participants completed the Emotion Reactivity Scale (ERS; Nock et al., 2008), a 21-item questionnaire developed to assess how individuals experience emotions. In particular, the ERS assesses three areas of the experience of emotions, including: (a) sensitivity (e.g., Even the littlest things make me emotional), (b) intensity (e.g., When I experience emotions, I feel them very strongly/intensely), and (c) persistency (e.g., When something happens that upsets me, it's all I can think about it for a long time). Validation of this measure has demonstrated good internal consistency (Cronbach's $\alpha = .94$) and adequate construct validity when compared to other measures (Nock et al., 2008). For the purpose of this study, questions that are the positive emotion equivalents for each item were added to the scale. For

example, “When something happens that makes me happy, it’s all I can think about it for a long time”. In the present study, the internal consistency of the ERS was also good both for negative emotional reactivity (Cronbach’s α :sensitivity = .92; intensity = .92; persistence = .80) and for positive emotional reactivity (Cronbach’s α: sensitivity = .86; intensity = .84; persistence = .77).

Emotion dysregulation. The Regulatory Emotional Self-Efficacy scale (RESE; Caprara & Gerbino, 2001) is a 12-item self-report measure designed to assess one’s efficacy in emotion regulation of negative (despondency and anger) and positive affect (including happiness, joy, and contentment). In past research, the RESE has acceptable construct, discriminant, and convergent validity (Caprara, Guida, Eisenberg, Gerbino, Pastorelli, & Tramontano, 2008; Totan, 2012). In the current study, the Cronbach’s alphas were .68 for despondency, .65 for anger, and .67 for positive emotions.

Emotional experiences. The Positive and Negative Affect Scale (PANAS; Watson et al., 1988) is a self-report measure designed to assess the frequency that an individual has experienced negative and positive emotions in the past day or week. Responses for each mood adjective are on a five-point Likert scale ranging from “very slightly or not at all” to “extremely”. The PANAS includes 10 positive mood adjectives: interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active. Negative mood adjectives include: distressed, upset, guilty, scared, hostile, irritable, nervous, jittery, and afraid. The PANAS demonstrates high internal consisted (NA α = .90 and PA α = .89) (Jenkins & Schmitz, 2012). The test-retest reliability of the PANAS has found to increase as the rated time frame increases (i.e. moment, day, week, few weeks) (Watson et al., 1988). In addition, the PANAS has been found to have adequate convergent and divergent validity (Watson et al., 1988). For the purposes of this study, the intensity of state-level emotions was measured by looking at the

change in responses from baseline to post-task intensity which will be interpreted as reactivity. Recovery time was measured by assessing emotions at one- and two-minutes post video clip.

Procedure

The following procedure for the study received Research Ethics Board (REB) clearance from the university's ethics committee. Participants were recruited in two ways. First, individuals were contacted as they were part of a research team database of individuals who had agreed to be contacted to participate in future studies of stress and coping and had also completed an early screening pertaining to their self-injury engagement. Participants were also recruited from an ad posted on the university's online classifieds and social media page. The study was advertised as a study investigating the emotion regulation of negative and positive emotions.

All participants were sent an e-mail invitation briefly describing the study and they were given a link to the online study as well as a participant ID. Upon accessing this link, participants were provided additional study information alongside an informed consent form.

The online survey consisted of the questionnaires described above. Participants started by completing the Stress and Coping Questionnaire. Individuals who indicated that they had engaged in NSSI in their lifetime, were then given the ISAS to complete. Those who indicated that the last time they had engaged in NSSI was in the last two years (dated from the day they filled out the survey), were included in the sample. All participants completed the ERS and the RESE, along with other questionnaires not part of this particular manuscript. Following completion of the survey, each participant was sent an email which included the necessary debriefing information and received $10 as well a list of resources should they require additional

support. The data were then coded and entered into a database, and no identifiable information was available through database access alone.

Participants who have a history of engaging in NSSI were then emailed and asked if they would be interested in participating in an in-person follow up study on emotions. Individuals matched on age but with no history of NSSI were also invited to participate as a comparison group.

Participation in the mood inducement task took place in an individual quiet room. Prior to completing the mood inducement task, participants were asked to complete the PANAS (Watson et al., 1988) to assess their baseline emotions and their relative intensity. Participants were randomized into one of the two orders of presentation of the videos (negative/positive). Participants were then presented with either Video 1 (a negative clip, in which a cat was trying to revive another cat who is lying motionless on the ground) or Video 2 (a positive clip, in which a young boy reports on the "10 things that we should say more often" in a humorous manner). These stimuli were chosen using the following rationale. Previous studies have focused mostly on negative emotions or have included positive emotions, but only in the form of still rather than dynamic images. According to Zhang and colleagues (2014), images mixed with music are effective ways of inducing emotions. Both negative and positive video clips had been previously piloted to ensure the appropriate effect was obtained and to determine the typical return to baseline timeframe. Based on this, following the mood induction, participants were asked to complete the PANAS, wait two minutes, and complete the PANAS once again. Following two administrations of the PANAS, a distractor task was provided to participants in which they were asked to complete some simple math problems. No time limit was given for the math problems. Following the completion of the distraction task, participants were again asked to complete

another baseline assessment of their emotions with the PANAS. Next, participants viewed their second video, depending on their random assignment. Following the short clip, participants completed the PANAS, waited two minutes again and then filled out the PANAS once more. Once participants completed the second PANAS, a final distraction task was given where participants were asked to do some additional math problems. Once the distractor task was completed, a final assessment of their emotions was done by having the participant fill out the PANAS. If participants' mood was not found to be back to baseline, they watched a clip from the television show "Friends." Participants were able to leave the office when their mood was comparable to their individual baseline.

Results

All analyses were conducted using SPSS version 24. Prior to the main analyses, patterns of missingness were evaluated and data cleaning was conducted. One participant was removed from the sample given that NSSI status had not been reported. As per recommendations by Tabachnick and Fidell (2012), the data were assumed to be missing completely at random (MCAR) given that less than 5% of data points were missing per variable. Therefore, the Expectation Maximisation procedure was used to impute missing values within each measure or subscale of both the NSSI and non-NSSI groups separately to increase the accuracy of the prediction. Following imputation, one participant in the non-NSSI group was identified as an outlier on emotion reactivity and was thus excluded from the final sample. Given that all other participants were female, another participant in the non-NSSI group who reported being male was also excluded from final analyses along with a randomly selected age-matched participant in the NSSI group. Therefore, the final sample consisted of 36 female participants with a history of NSSI over

the past two years (*M*age = 20.06 years; *SD* = 1.51) and 34 female participants without a history of NSSI (*Mage* = 20.15 years; *SD* = 1.54).

Table 1 presents means and standard deviations for emotion reactivity and regulation of negative and positive emotions. The first objective was to compare women with and without a history of NSSI in terms of their self-reported reactivity to positive and negative emotions. Separate one-way MANOVAs were conducted to test whether females with a history of NSSI would report worse emotional reactivity for negative emotions (H1A) and positive emotions (H1b) than those without a history of NSSI. Consistent with H1a, it was revealed that women with a history of NSSI reported significantly worse emotional reactivity for negative emotions compared to those without a history of NSSI, Wilk's $\Lambda = .81$, $F(3,66) = 5.15$, $p = .003$, $\eta_p^2 = .19$. Specifically, they reported higher levels of sensitivity ($F(1,68) = 14.87$, $p < .001$, $\eta_p^2 = .18$), intensity ($F(1,68) = 10.03$, $p = .002$, $\eta_p^2 = .13$), and persistence ($F(1,68) = 12.07$, $p = .001$, $\eta_p^2 = .15$) for negative emotions. However, contrary to H1b, no significant differences were found when a separate MANOVA was conducted for positive emotional reactivity, Wilk's $\Lambda = .99$, $F(3,66) = .15$, $p = 932$, $\eta_p^2 = 007$. Further, partial eta-squared suggested a moderate to large effect size for negative emotional reactivity and a small to moderate effect size for positive emotional reactivity.

The second objective of the present paper was to investigate group differences in terms of self-reported emotion regulation for negative and positive emotions between women with and without a history of NSSI. Similarly to the first objective, a one-way MANOVA was conducted to test H2a that women with a history of NSSI would report worse emotion regulation for negative emotions. Results revealed significant group differences at the multivariate level, Wilk's $\Lambda = .88$, $F(2,67) = 4.46$, $p = .015$, $\eta_p^2 = .746$. Specifically, women with a history of NSSI

reported worse negative emotion regulation for both despondency ($F(1,68) = 5.97$, $p = .017$, $\eta_p^2 = .08$) and anger ($F(1,68) = 7.05$, $p = .01$, $\eta_p^2 = .09$) compared to women without a history of NSSI, with a moderate effect size. A one-way ANOVA was then conducted to test H2b that women with a history of NSSI engagement would report worse emotion regulation for positive emotions than those without. However, contrary to H2b, no significant differences were found between those with and without a history of NSSI for emotion regulation of positive emotions, $F(1,68) = .27$, $p = .605$, $\eta_p^2 = .004$.

The third objective aimed to compare negative and positive emotions for women with and without a history of NSSI in response to a negative and positive mood inducement. Four separate 2 (Group: NSSI vs non-NSSI) X 4 (Time: pre, post, 1 minute post, 2 minute post) repeated measures ANOVAs were conducted: one for each type of negative and positive emotion within each condition (negative vs. positive mood inducement). Results are presented in Table 2 and Figure 1. Significant main effects of Time were found for each repeated measures ANOVA across negative and positive affect and mood inducement task. Specifically, as expected, in the negative mood inducement negative affect significantly increased post-inducement while positive affect significantly decreased, and the opposite pattern was found in the positive mood inducement (see Table 3 for pairwise comparisons). In terms of main effects for Group (NSSI vs. non-NSSI), women with a history of NSSI did not report significantly different affect compared to their non-NSSI peers in either mood inducement task except for higher negative affect in the positive mood inducement (H3b). No significant interactions were found across the negative or positive affect and mood inducement tasks.

Discussion

The purpose of the present study was threefold: 1) to investigate individuals' self-report of general tendencies of emotional reactivity, 2) to investigate self-reports of general tendencies of emotional regulation, and 3) to explore in-person experience of negative and positive emotions and their subsequent reactivity and regulation to emotional (negative and positive) stimuli. Consistent with previous studies, results revealed that individuals with a history of NSSI reported significantly greater difficulties in negative emotional reactivity than the comparison group on the self-report questionnaires (e.g., Gratz, 2006; Jenkins & Schmitz, 2012; Najmi et al., 2007). In addition, similar to the findings of Stern and colleagues (2018a), no differences were found for reactivity of positive emotions between females with and without NSSI.

With respect to individuals' ability to regulate their emotions, a similar pattern was found. Specifically, individuals with a history of NSSI reported significantly greater difficulties in regulating their negative emotions than females without the same history. In contrast, no differences in the regulation of positive emotions were found between the two groups. The findings for negative emotion reactivity and regulation are consistent with previous studies examining the emotion regulation of negative emotions of individuals with and without a history of NSSI (e.g., Gratz & Roemer, 2008; Heath et al., 2008; Peh et al., 2017; Titelius et al., 2018; You et al., 2018). While the regulation of positive emotions has not yet been widely investigated, the results of the current study did not find any significant difference between individuals with and without a history of NSSI in the self-report of regulation of positive emotions. These results are not in-line with those found by Stern and colleagues (2018b), despite the overlap in terms of sample with the participants in the current study. These

differences may be due to the smaller sample size in the current study, which resulted in low power.

Contrary to what was hypothesized, data from the mood inducement task indicated no group differences in reactivity or regulation for either negative or positive emotions. As previously mentioned, individuals who participated in a study by Arbuthnott and colleagues (2014) were asked to think about a personal experience that was upsetting to them and why they felt the way they did about that situation. The authors found that individuals with a history of NSSI reported significant changes in negative emotion when using a task of rumination, compared to individuals without the same history of NSSI. These differences may be explained by the personal nature of the task participants were asked to complete. However, our results are consistent with the study by Davis and colleagues (2014). Namely, they did not find group differences (NSSI and non-NSSI) in reactivity when viewing standardized images (positive, negative, and neutral) or a negative video clip.

Overall, the results of the current study suggest that individuals with a history of NSSI may process negative situations differently from individuals without such a history, particularly when individuals think about their general personal experiences and reactions, such as in self-report questionnaires. However, when participants watch the same video depicting a sad event, individuals with a history of NSSI report the same reaction as those without a history of self-injury. Accordingly, it is possible that the specific cognitive emotion regulation strategies, such as rumination, used in the face of personal emotional experiences make it more difficult to cope with certain events and experiences (eg., Andrews et al., 2013; Hasking et al., 2008; Turner et al., 2012). More specifically, it is possible that when individuals with a history of NSSI think about their own personal experiences, for example, when filling out a self-report or when asked

to ruminate about a negative event, it is their cognitive processes that embark and influence their emotional reactivity and regulation. Considering that the mood induction used in the current study did not have any relation to participants' personal experiences, the experimental task may not have picked up on the same reactivity and regulation that are representative of such situations in an individual's life.

Limitations and Future Directions

The present study has a number of limitations. First, the current study is limited in its investigation of the emotional reactivity and regulation in females as there were not a sufficient number of males who volunteered to participate in this study. Second, future studies would benefit from a standardized situation in a lab setting, that relate to the participants' personal experiences. For example, a situation could be set up with the use of confederates that causes an unsettling or positive situation involving the participant. This methodology would provide the opportunity to understand whether individuals with a history of NSSI and those who do not would react and respond differently to a situation that they are involved in (such as the rumination task that was done Arbuthnott and colleagues' (2014) study). At the same time, this would be done in a standardized manner so that all participants are faced with and coping with the same situation. This research design would help support the argument that it is individuals' perception and cognitive strategies that result in emotions that become increasingly difficult to regulate. Third, the current study did not control for the comorbidity of different emotional disorders or symptomatology, including depression, anxiety, and borderline personality disorder. In line with this, controlling for the use of whether or not individuals take medication for their difficulties is also an important factor to consider. Symptoms of emotional disorders and medication use can play a role on the processes of emotional reactivity and emotional regulation.

Clinical Implications

This study highlights a significant difference in perceived and actual emotion reactivity and regulation on a standardized task. Accordingly, it could be other factors, such as the cognitive processes that individuals use following the experience of a negative personal situation that lead to the downwards emotional spiral that has been labelled the emotional cascade model (Selby, Anetis, Bender, & Joiner, 2009). Consequently, the use of unhelpful cognitive processes may be causing individuals with a history of NSSI to misinterpret their emotional reactions and subsequent regulation of their positive and negative emotions. Therefore, therapeutic modalities that work on individuals' thoughts may be useful to help individuals accurately perceive their emotional reactivity as well as their ability to regulate emotions. The use of such techniques has already been found to be beneficial for individuals with a history of NSSI (e.g., Schroever & Brandsma, 2009; Wadlinger & Isaacowitz, 2008). Based on the results of this study, it is believed that the use of healthy cognitive strategies, such as reappraisal, could be used to change one's perception of their abilities. In addition, elements of mindfulness, such as mindfulness meditation, which involves training one's attention toward the present moment in an open-minded (nonjudgmental) way are important to consider (Garland et al., 2011). This is consistent with results from a study by Heath and colleagues (2016), which found that increased levels of mindfulness were associated with an increase in individuals' sense of control in dealing with intense negative emotions. It is possible that if individuals' perceived reactivity and regulation of emotions were less negative, this population would be better able to cope with emotional situations.

Conclusion

Despite the limitations in the current study, there are numerous findings with important implications for future research and clinical practice in the area of NSSI. In particular, this is the first study to look at the differences in emotional reactivity and regulation for both negative and positive emotions across questionnaires of general tendencies and an in-person mood-induction. The findings of the current study suggest that individuals with a history of NSSI may not differ from individuals who have not engaged in NSSI when experiencing negative and positive stimuli. Consequently, the results of this study may have implications for the clinical treatment of individuals who engage in NSSI, specifically concerning the possible benefits of working on cognitive reappraisal and mindfulness meditation. Future research is needed to better understand the role reactivity and regulation of emotions across different situations.

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Table 1.
Means and Standard Deviations for Negative and Positive Emotional Reactivity and Regulation

	NSSI		No-NSSI	
	M	*SD*	*M*	*SD*
Negative Emotional Reactivity				
Sensitivity	24.26	9.96	15.53	8.92
Intensity	16.38	8.23	10.65	6.80
Persistence	9.56	4.14	6.35	3.53
Positive Emotional Reactivity				
Sensitivity	15.72	8.18	14.82	7.59
Intensity	9.97	5.83	9.65	5.41
Persistence	6.08	4.11	5.62	2.83
Emotion Regulation				
Despondency	4.78	2.83	6.47	2.97
Anger	5.28	3.08	7.12	2.69
Positive Emotions	10.47	3.08	10.85	3.05

Table 2.
Results of 2(Group: NSSI vs. non-NSSI) X 4(Time: pre, post, 1 minute post, 2 minutes post) Repeated Measures ANOVAs for Negative and Positive Affect Following a Negative and Positive Mood Inducement

Negative Affect – Negative Mood Inducement	
Mauchly's test of sphericity - Time	χ^2 (5) = 46.71, $p < .001$
Interaction	$F(3,204) = .675$, $p = .568$, $\eta_p^2 = .010$
Main effect of Time (within)	$F(2.24,204) = 22.94$, $p < .001$, $\eta_p^2 = .252$
Main effect of Group (between)	$F(1,68) = .886$, $p = .350$, $\eta_p^2 = .013$
Positive Affect – Negative Mood Inducement	
Mauchly's test of sphericity - Time	χ^2 (5) = 37.53, $p < .001$
Interaction	$F(3,204) = .419$, $p = .739$, $\eta_p^2 = .006$
Main effect of Time (within)	$F(2.18,204) = 68.26$, $p < .001$, $\eta_p^2 = .501$
Main effect of Group (between)	$F(1,68) = 3.13$, $p = .081$, $\eta_p^2 = .044$
Negative Affect – Positive Mood Inducement	
Mauchly's test of sphericity - Time	χ^2 (5) = 63.02, $p < .001$
Interaction	$F(3,204) = .838$, $p = .475$, $\eta_p^2 = .012$
Main effect of Time (within) – *Greenhouse-Geisser*	$F(2.03,204) = 61.03$, $p < .001$, $\eta_p^2 = .178$
Main effect of Group (between)	$F(1,68) = .579$, $p = .449$, $\eta_p^2 = .008$
Positive Affect – Positive Mood Inducement	
Mauchly's test of sphericity - Time	χ^2 (5) = 35.23, $p < .001$
Interaction	$F(3,204) = .89$, $p = .450$, $\eta_p^2 = .013$
Main effect of Time (within) – *Greenhouse-Geisser*	$F(2.4,204) = 37.88$, $p < .001$, $\eta_p^2 = .358$
Main effect of Group (between)	$F(1,68) = .88$, $p = .351$, $\eta_p^2 = .013$

Table 3.
Results of Pairwise Comparisons of Time Based on Estimated Marginal Means for 2(Group: NSSI vs. non-NSSI) X 4(Time: pre, post, 1 minute post, 2 minutes post) Repeated Measures ANOVAs for Negative and Positive Affect Following a Negative and Positive Mood Inducement

	M	***SD***
Negative Affect – Negative Mood Inducement		
Pre	14.35 [a]	.63
Post	17.40 [b]	.70
1 minute post	15.88 [c]	.66
2 minutes post	14.12 [a]	.59
Positive Affect – Negative Mood Inducement		
Pre	24.57 [a]	.85
Post	18.94 [b]	.68
1 minute post	18.43 [b,c]	.72
2 minutes post	18.85 [b,c,d]	.77
Negative Affect – Positive Mood Inducement		
Pre	13.71 [a]	.46
Post	12.10 [b]	.31
1 minute post	12.09 [b,c]	.34
2 minutes post	12.47 [b,c,d]	.38
Positive Affect – Positive Mood Inducement		
Pre	23.85[a]	.82
Post	27.29[b]	1.07
1 minute post	23.79[a]	.98
2 minutes post	21.41[c]	.92

Note. Significant differences in reports of affect over time points, as found using pairwise comparisons of estimated marginal means, are indicated by superscript letters within the column for means. Time points with the same superscript letter are not significantly different from one another.

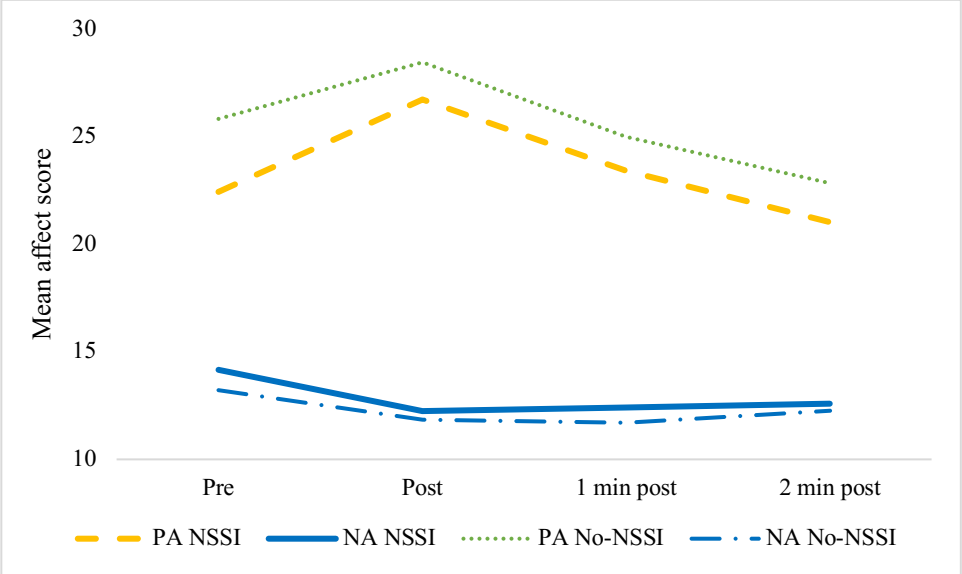

Figure 1a. Positive mood inducement pre- and post- Mean negative (NA; blue lines) and positive (NA; orange lines) affect scores for women with and without a history of NSSI.

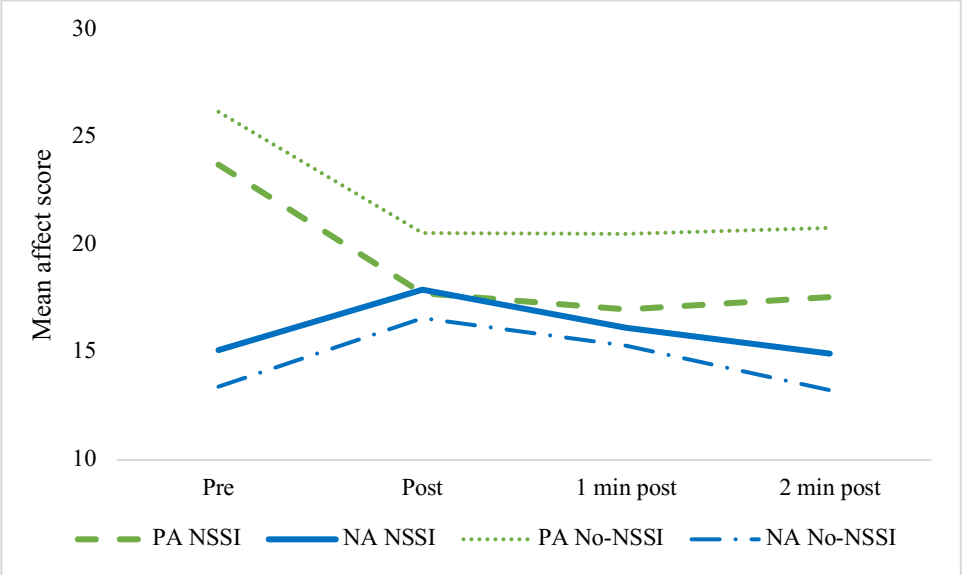

Figure 1b. Negative mood inducement pre- post- Mean negative (NA; blue lines) and positive (PA; orange lines) affect scores for women with and without a history of NSSI

CHAPTER 5

Discussion

Summary of Findings and Original Contributions to Knowledge

Given the well-established link between negative emotions and NSSI, much focus has been placed on this population (e.g., Anderson & Crowther, 2012; Chapman et al., 2006; Gratz & Roemer, 2004; 2008). However, the role of positive emotions in the etiology and maintenance of NSSI has been largely overlooked. Drawing from research on the role of positive emotions in fostering resilience and effective strategies for emotion regulation, this dissertation applied the tenets of the broaden-and-build theory (Frederickson, 1998; 2001) to further current understanding of the emotional factors that differentiate individuals with and without a history of NSSI.

The first manuscript introduced the broaden-and-build theory (Fredrickson, 1998, 2001) into the NSSI literature by including positive emotions when exploring a key known vulnerability factor related NSSI, particularly emotional reactivity. Similar to previous studies (e.g., Anderson & Crowther, 2012; Gratz, 2006; Jenkins & Schmitz, 2012), differences in negative emotional reactivity were found between individuals with a reported history of NSSI and those without such history. More specifically, the NSSI group reported higher levels of sensitivity, intensity, and persistence (time needed to recover) than individuals who had not reported engaging in NSSI. However, no differences were found when looking at group differences in positive emotional reactivity. Interestingly, it was found that an increased duration of one's negative emotions (greater persistency of negative emotions) was able to predict whether an individual was likely to engage in NSSI. Consistent with the experiential avoidance model proposed by Chapman and colleagues (2006), individuals who are experiencing long

lasting negative emotions are more prone to resort to less healthy ways of regulating their emotions. Accordingly, it appears that the lasting effect of the emotion, and thus an individual's ability to regulate the emotion in order for it to dissipate, is playing an important role in whether individuals are engaging in NSSI.

Researchers have already established a connection between emotion dysregulation and NSSI (e.g., Gratz & Roemer, 2008; Heath et al., 2008). Although not specifically studied in individuals who engage in NSSI, emotion dysregulation of positive emotions has been found in populations with known negative emotional dysregulation to engage in NSSI, such as Major Depressive Disorder (MDD) and Borderline Personality Disorder (BPD) (Beblo et al., 2011; Feldman et al., 2008; Liu & Thompson, 2017; Rosenbaum Arsanow et al., 2011). Building on these findings, Manuscript 2 aimed to comprehend the emotion regulation processes across negative and positive emotions as well as identify which strategies are used when individuals are coping with both negative and positive emotions in individuals with a history of NSSI. Similar to previous findings that included either both genders or only females (e.g., Andrews et al., 2013; Gratz & Roemer, 2008; Turner et al., 2012), females with a history of NSSI were found to report greater emotion dysregulation with respect to their negative emotions. Interestingly, the same was found in relation to their positive emotions. More specifically, females with a history of engaging in NSSI were found to report higher levels of positive emotion dysregulation than those females who did not engage in NSSI. When looking more specifically at the type of strategies used, a similar pattern was found regardless of an individual's history of NSSI. In particular, individuals are more likely to use unhealthy strategies in the face of negative emotions, and healthy strategies in positively-valenced situations. However, females with a history of NSSI use these healthy strategies to a lesser degree than individuals without the same history. The

results of this study also provided support for the tenets of the broaden-and-build theory (Fredrickson, 1998; 2001), which posits that the experience of positive emotions will increase an individual's ability to skillfully regulate their negative emotions. In other words, if individuals who engage in NSSI are not able to adequately savour and hold on to their positive emotions, they will face more difficulty improving the regulation of their negative emotions.

Taken together, the results of manuscripts 1 and 2 suggest that females who engage in NSSI have significantly more persistent negative emotions and difficulties with the regulation of both negative and positive emotions. Manuscript 3 builds on these findings by comparing participants' responses on questionnaires related to their general experiences to responses produced by an in-person mood induction. The mood induction involved a standardized set of videos; one positive valence and one negative valence. Females' reactions and the duration before going back to baseline were rated in order to get a sense of their emotional reactivity and regulation. The results indicated that females with a history of NSSI reported significantly greater difficulties in negative emotional reactivity and regulation on the self-report questionnaires. In contrast, no group differences were found for positive emotional reactivity and regulation. Furthermore, participants' responses to the mood inducement task revealed no group differences in reactivity or regulation for either negative or positive emotions.

It is important to note that due to a lack of previous research on positive emotions and NSSI, many of the hypotheses relating to positive emotions were based off of research in other populations with known difficulties in emotional reactivity and regulation, such as depression and borderline personality disorder. While our hypotheses related to negative emotions were mostly supported and consistent with previous NSSI literature, the same is not true with respect to positive emotions. More specifically, females with and without a history of NSSI did not

show any differences in their reactivity to positive emotions. Furthermore, there were no differences in how females with and without a history of NSSI reacted to the positively valanced video. On the other hand, there was a difference found in the emotional dysregulation of positive emotions in females with and without a history of NSSI. Further research is needed to determine whether these results are due to the chosen methodology of the three studies or if there are no inherent differences in these constructs in this population.

Overall, the results of the three studies suggest that females perceive their general tendencies related to emotional reactivity and regulation in negative situations as worse than it was found on a standardized mood inducement task. The same is true for the regulation of positive emotions. Accordingly, females with a history of NSSI may be less reactive to negative situations and may be better at regulating their emotions (negative and positive) than they believe. However, these findings are especially important as they suggest that females' emotional processes may differ depending on whether the situation is personally relevant or not. Therefore, the findings of this study demonstrate that our understanding of NSSI and emotions needs to go beyond that of negative emotions and include positive emotions as is outlined in the broaden and build theory (Fredrickson, 1998, 2001). These results have the potential to drive future research programs in the field of NSSI and allow for a better selection of clinical strategies when working with this population.

Directions for Future Research

The present program of research used the principles of the broaden-and-build theory (Fredrickson, 1998; 2001) to improve our understanding of how emotional reactivity and emotional regulation play a role in NSSI. Future research should look to extend this work in several ways. Firstly, the current program of research only included female participants;

however, males are known to engage in NSSI in high numbers. According to Whitlock and colleagues (2011), female college students are nearly twice as likely to report have ever engaged in NSSI than males. In addition, female college students report more lifetime incidents of NSSI than males. However, when considering rates of self-injury within the past year, female college students are equally as likely to engage in NSSI as males. Other studies have not found a significant difference in rates of NSSI reported by females and males (e.g., Gollust et al., 2010; Gratz, Conrad & Roemer, 2007). In addition to only having females, participants were also limited to University students, which thus excluded all individuals (with and without a history of NSSI) in the general population. Therefore, it would be important for future studies to accurately reflect the population profile of NSSI that has been previously established in the literature.

In order to further the research on positive emotions and NSSI, it would be useful for different types of methodologies to be used when looking at the same constructs as the current program of research. For example, questionnaires about general tendencies such as the Emotion Reactivity Scale (ERS; Nock et al., 2008) and the Regulatory Emotional Self-Efficacy scale (RESE; Carparara & Gerbino, 2001) could be combined with diaries of individuals' experiences of reactivity and emotion regulation. Such methodology would allow for a better understanding of how negative and positive emotions are experienced in distinct daily situations, instead of an overall view of generalized responses. Furthermore, for mood inducement studies, it is important for participants to receive standardized stimuli in order to ensure that the stimuli are of similar quality for all individuals. However, the current program of research, along with other studies using personal situations such as images and photos, are not picking up on a key factor that could be differentiating individuals with and without a history of NSSI. Rather, it appears

that differences are being found when individuals' personal experiences are investigated, such as in mood inducement task that asks participants to ruminate about a past experience (Arbuthnott et al., 2011). Consequently, future studies would benefit from a standardized interpersonal situation in the lab setting, perhaps with the use of confederates to ensure that the quality of the stimuli is similar for all participants and also to provide the personal factor that seems to be missing from previous mood induction studies.

Clinical Implications

The present findings provide support for integrating the broaden-and-build theory's principles (Fredrickson, 1998, 2001) into practice. According to Garland and colleagues (2010), repetitive exposure to a negative stimulus, such as rejection from a peer, can produce increasingly more intense emotions and behavioural responses. Presently, there are many therapeutic approaches that directly target negative emotions in individuals with a history of NSSI, such as Cognitive Behavioural Therapy (CBT) and Dialectical Behavioural Therapy (DBT, (Linehan, 1993).

According to Garland and Howard (2009), it is positive emotional states that foster lasting changes in the brain. More specifically, it is the experience of positive emotional states that promote future healthy thoughts and behaviours, which translate into upward spirals of well-being and that positive emotions. (Garland, Fredrickson, Kring, Johnson, Meyer, & Penn, 2010). It is also believed that positive emotions can be intentionally self-generated (Garland et al., 2010). Consequently, clinical and therapeutic approaches must start to consider and integrate more tools that focus on producing positive emotional situations in individuals with a history of NSSI. For example, behavioural activation, which is a main component of CBT, can create positive emotions given that it promotes positive activities and behaviours. A mindfulness

approach has also become more widespread in clinical practice and has also been found to be successful in individuals with a history of NSSI (Heath, Carsley, De Riggi, Mills, & Mettler, 2016; Heath, Joly, & Carsley, 2016). More specifically, mindfulness has been used to increase awareness and attention to positive events (Garland et al., 2010). Incorporating various approaches into treatment that target the regulation of both negative and positive emotions can provide individuals with the abilities they need to effectively manage their emotions, regardless of valence.

Implications for School Psychologists

Considering that the onset of NSSI most often occurs in adolescence (Heath et al., 2008, Muehlenkamp & Gutierrez, 2007; Nock & Prinstein, 2004; Ross & Heath, 2002), the role of school mental health professionals is extremely important for this population and before the students get to university. Nonetheless, universities could establish programs and groups aimed to develop healthy skills for emotional reactivity and regulation. Previous researchers have suggested that schools should introduce programs to teach students about healthy coping strategies (Toste & Heath, 2010). However, similar to clinical practice, much of the focus is placed on coping with negative emotions. Therefore, professionals need to also work with students on improving their awareness and savouring strategies. For example, students could do projects that center on gratitude and have regular discussions regarding positive experiences that have happened in their school environment, whether current, past, or present. Regardless of the program and exercises, it has been found to be fundamental that schools need to expose students to positive psychology over multiple years and also integrate it into their culture (Waters, 2011). In fact, higher levels of success are found when the entire school staff is trained in positive psychology and principles are modeled and supported throughout the school (Waters, 2011).

The implementation of such activities and programs have the potential to promote healthy emotion regulation across students and potentially decrease the possibility of regulating emotions using NSSI.

Concluding Comments

The current program of research represents an original contribution as it applies the broaden-and-build theory to further our understanding of the role of positive emotions in NSSI. In summary, this program of research supports previous findings that individuals with a history of NSSI report negative emotional reactivity. In addition, the current program's findings seem to indicate the presence of self-reported emotion dysregulation in the NSSI population, for both negative and positive emotions. However, the mood induction highlights the possibility that personally-relevant situations may result in different patterns of reactivity and regulation than those that do not personally relate to participants. Future research is needed to advance our understanding of such patterns. At the same time, the results of the current program highlight important tools that can be used for therapeutic prevention and intervention.

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Appendix A

Stress and Coping Questionnaire

SECTION A
1-Age: …….. **2-Date of Birth (d/m/y):** ____/____/_____
3-Place of Birth:……..…… **4-Ethnicity:**…….……
5-Your First Language:…… **6-Your Second Language:**……...……. **7-Other Languages:** ……..……...……
8-Program of study:…..…… ……..…….…….
9-Year of study (circle one): U0 (prerequisites) U1 U2 U3 U4
10-Is this your first year studying in a university? Yes No
11-Do you live alone? Yes No (**If no, who do you live with?** ……...……...……)
12-Do you live in a university residence? Yes No
13-Did you have to relocate to come to McGill? No Yes (**if yes, where did you relocate from?**……)
14-What is your current status in Canada? Citizen Immigrant International Student Not listed (please specify:……..……..……)
15-Do you consider yourself a visible or an ethnic minority? No Yes (please specify:……...……)
16-What gender identity do you currently most identify with? Male Female Trans* Not listed (please specify:…….……....) ***** *Trans* is an umbrella term that includes people whose gender identity, expression, or behaviour is different from those often associated with their assigned sex at birth.
17-What sexual orientation do you currently most identify with? Heterosexual Gay Lesbian Bisexual Not listed (please specify:……..…….)

SECTION B					
The questions below ask you about your feelings and thoughts during the LAST MONTH. In each case, please indicate how often you felt or thought a certain way.					
	Never	**Almost Never**	**Sometimes**	**Fairly Often**	**Very Often**
18-In the last month, how often have you felt that you were unable to control the important things in your life?	**Never**	**Almost Never**	**Sometimes**	**Fairly Often**	**Very Often**
19R-In the last month, how often have you felt confident about your ability to handle your personal problems?	**Never**	**Almost Never**	**Sometimes**	**Fairly Often**	**Very Often**
20-In the last month, how often have you felt that things were going your way?	**Never**	**Almost Never**	**Sometimes**	**Fairly Often**	**Very Often**
21-In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	**Never**	**Almost Never**	**Sometimes**	**Fairly Often**	**Very Often**

SECTION C

Please read each of the following behaviours and indicate, *in each column*, whether you have:

1) engaged in the behaviour *during your lifetime*

2) engaged in the behaviour *during the past 12 months*

3) *used the behaviour to cope with stress*.

Please, circle all that apply.

LIST OF BEHAVIOURS	1) I have *engaged in this behaviour during my lifetime*.	2) I have engaged in this behaviour *during the past 12 months*.	3) I have used this behaviour *to cope with stress.*
22-Meditation and/or mindfulness activities	YES NO	YES NO	YES NO NOT SURE
23-Frequent (most days of the week) food restriction	YES NO	YES NO	YES NO NOT SURE
24-Frequent* overeating	YES NO	YES NO	YES NO NOT SURE
25-Self-injuring without wanting to die (e.g. *self-cutting, self-hitting, burning, bruising, scratching)*	YES NO	YES NO	YES NO NOT SURE
26-Frequent* drug use (*e.g. recreational drugs, hard drugs, illegal prescription drug*s)	YES NO	YES NO	YES NO NOT SURE
27-Frequent* alcohol use	YES NO	YES NO	YES NO NOT SURE
28-Praying or engaging in religious activities	YES NO	YES NO	YES NO NOT SURE
29-Interacting online with *people you only know online*	YES NO	YES NO	YES NO NOT SURE
30-Playing games frequently* on a gaming console, on a phone (*e.g. Candy Crush*), on a computer (*e.g WoW*), or on a social networking site (*e.g. FarmVille*)	YES NO	YES NO	YES NO NOT SURE

*Frequent: most days of the week

SECTION D

YOUR FAMILY MEMBERS, CLOSE FRIENDS, AND ROMANTIC PARTNERS

Please go through all the items below and indicate if you *currently have* or *you have ever had* a family member, close friend, or romantic partner who has *ever* engaged in the following coping behaviours.

LIST OF BEHAVIOURS	FAMILY Check the boxes below if you currently have or have had a *FAMILY MEMBER* who has *ever* engaged in this behaviour.	CLOSE FRIEND Check the boxes below if you currently have or have had a *CLOSE FRIEND* who has *ever* engaged in this behaviour.	ROMANTIC PARTNER Check the boxes below if you currently have or have had a *ROMANTIC PARTNER* who has *ever* engaged in this behaviour.
31-Meditation or another mindfulness activity	YES NO	YES NO	YES NO
32-Frequent (most days of the week) food restriction	YES NO	YES NO	YES NO
24-Frequent* overeating	YES NO	YES NO	YES NO
33-Self-injuring without wanting to die (e.*g. self-cutting, self-hitting, burning, bruising, scratching*)	YES NO	YES NO	YES NO
34-Frequent* alcohol use	YES NO	YES NO	YES NO
35-Frequent* drug use	YES NO	YES NO	YES NO
36-Praying or engaging in religious activities	YES NO	YES NO	YES NO
37-Frequent* gaming on a gaming console, phone (*e.g. Candy Crush*), computer (*e.g WoW*), or social networking site (*e.g. FarmVille*)	YES NO	YES NO	YES NO

*Frequent: most days of the week

Please feel free to provide any comments: …….
…….
…….
…….
.....

Appendix B

INVENTORY OF STATEMENTS ABOUT SELF-INJURY (ISAS) – SECTION I. BEHAVIORS

This questionnaire asks about a variety of self-harm behaviors. Please only endorse a behavior if you have done it intentionally (i.e., on purpose) and without suicidal intent (i.e., not for suicidal reasons).

1. Please estimate the number of times in your life you have intentionally (i.e., on purpose) performed each type of non-suicidal self-harm (e.g., 0, 10, 100, 500):

Cutting	____	Severe Scratching	____
Biting	____	Banging or Hitting Self	____
Burning	____	Interfering w/ Wound Healing (e.g., picking scabs)	____
Carving	____	Rubbing Skin Against Rough Surface	____
Pinching	____	Sticking Self w/ Needles	____
Pulling Hair	____	Swallowing Dangerous Substances	____
Other _____,	____		

****

***Important*: If you have performed one or more of the behaviors listed above, please complete the final part of this questionnaire. If you have not performed any of the behaviors listed above, you are done with this particular questionnaire and should continue to the next.**

****

2. If you feel that you have a *main* form of self-harm, please circle the behavior(s) on the first page above that you consider to be your main form of self-harm.

3. At what age did you:

First harm yourself? _____ Most recently harm yourself? _____
(approximate date – month/date/year)

4. Do you experience physical pain during self-harm?

Please circle a choice: YES SOMETIMES NO

5. When you self-harm, are you alone?

Please circle a choice: YES SOMETIMES NO

6. Typically, how much time elapses from the time you have the urge to self-harm until you act on the urge?

Please circle a choice:

< 1 hour 1 - 3 hours 3 - 6 hours

6 - 12 hours 12 - 24 hours > 1 day

7. Do/did you want to stop self-harming?

Please circle a choice: YES NO

Appendix C

Emotion Reactivity Scale

This questionnaire asks different questions about how you experience emotions **on a regular basis (for example, each day)**. When you are asked about being "emotional," this may refer to being angry, sad, or some other negative emotion. Please rate the following statements.

0 Not at all like me	**1** A little like me	**2** Somewhat like me	**3** A lot like me	**4** Completely like me

1	When something happens that upsets me, it's all I can think about it for a long time.	**0**	**1**	**2**	**3**	**4**
2	My feelings get hurt easily.	**0**	**1**	**2**	**3**	**4**
3	When I experience negative emotions, I feel them very strongly/intensely.	**0**	**1**	**2**	**3**	**4**
4	When I'm emotionally upset, my whole body gets physically upset as well.	**0**	**1**	**2**	**3**	**4**
5	When I'm upset, I tend to get very emotional very easily.	**0**	**1**	**2**	**3**	**4**
6	I experience negative emotions very strongly.	**0**	**1**	**2**	**3**	**4**
7	When I'm upset, I often feel extremely anxious.	**0**	**1**	**2**	**3**	**4**
8	When I feel emotionally upset, it's hard for me to imagine feeling any other way.	**0**	**1**	**2**	**3**	**4**
9	When I'm upset, even the littlest things make me emotional.	**0**	**1**	**2**	**3**	**4**
10	If I have a disagreement with someone, it takes a long time for me to get over it.	**0**	**1**	**2**	**3**	**4**
11	When I am upset, it takes me much longer than most people to calm down.	**0**	**1**	**2**	**3**	**4**
12	I get angry at people very easily.	**0**	**1**	**2**	**3**	**4**
13	When I am upset, I am often bothered by things that other people don't react to.	**0**	**1**	**2**	**3**	**4**
14	When I am upset, I am easily agitated.	**0**	**1**	**2**	**3**	**4**
15	When I am upset, my emotions go from neutral to extreme in an instant.	**0**	**1**	**2**	**3**	**4**
16	When something bad happens, my mood changes very quickly. People tell me I have a very short fuse.	**0**	**1**	**2**	**3**	**4**
17	When I am upset, people tell me that my emotions are often too intense for the situation.	**0**	**1**	**2**	**3**	**4**
18	When I am upset, I am a very sensitive person.	**0**	**1**	**2**	**3**	**4**
19	When I am upset, my moods are very strong and powerful.	**0**	**1**	**2**	**3**	**4**
20	I often get so upset it's hard for me to think straight.	**0**	**1**	**2**	**3**	**4**
21	When I am upset, other people tell me I'm overreacting.	**0**	**1**	**2**	**3**	**4**

This questionnaire asks different questions about how you experience emotions **on a regular basis (for example, each day)**. When you are asked about being "emotional," this may refer to being happy, joyful, or some other positive emotion. Please rate the following statements.

		0 Not at all like me	**1** A little like me	**2** Somewhat like me	**3** A lot like me	**4** Completely like me
1	When something happens that makes me happy, it's all I can think about it for a long time.	**0**	**1**	**2**	**3**	**4**
2	I experience positive emotions easily.	**0**	**1**	**2**	**3**	**4**
3	When I experience positive emotions, I feel them very strongly/intensely.	**0**	**1**	**2**	**3**	**4**
4	When I'm emotionally happy, my whole body gets physically happy as well.	**0**	**1**	**2**	**3**	**4**
5	When I'm happy, I tend to get very emotional very easily.	**0**	**1**	**2**	**3**	**4**
6	I experience positive emotions very strongly.	**0**	**1**	**2**	**3**	**4**
7	When I'm happy, I often feel extremely carefree.	**0**	**1**	**2**	**3**	**4**
8	When I feel emotionally happy, it's hard for me to imagine feeling any other way.	**0**	**1**	**2**	**3**	**4**
9	When I'm happy, even the littlest things make me emotional.	**0**	**1**	**2**	**3**	**4**
10	If I have a positive interaction with someone, it takes a long time for me to come down from the high.	**0**	**1**	**2**	**3**	**4**
11	When I am happy, it takes me much longer than most people to calm down.	**0**	**1**	**2**	**3**	**4**
12	People make me happy very easily.	**0**	**1**	**2**	**3**	**4**
13	When I am happy, I become emotional over things that other people don't react to.	**0**	**1**	**2**	**3**	**4**
14	When I am happy, I am easily excited.	**0**	**1**	**2**	**3**	**4**
15	When I am happy, my emotions go from neutral to extreme in an instant.	**0**	**1**	**2**	**3**	**4**
16	When something good happens, my mood changes very quickly. People tell me I am very quick to react.	**0**	**1**	**2**	**3**	**4**
17	When I am happy, people tell me that my emotions are often too intense for the situation.	**0**	**1**	**2**	**3**	**4**
18	When I am happy, I am a very sensitive person.	**0**	**1**	**2**	**3**	**4**
19	When I am happy, my moods are very strong and powerful.	**0**	**1**	**2**	**3**	**4**
20	I often get so happy it's hard for me to think straight.	**0**	**1**	**2**	**3**	**4**
21	When I am happy, other people tell me I'm overreacting.	**0**	**1**	**2**	**3**	**4**

Appendix D

Positive and Negative Affect Scale (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment.**

	1 Very Slightly or Not at All	2 A Little	3 Moderately	4 Quite a Bit	5 Extremely
1. Interested					
2. Distressed					
3. Excited					
4. Upset					
5. Strong					
6. Guilty					
7. Scared					
8. Hostile					
9. Enthusiastic					
10. Proud					
11. Irritable					
12. Alert					
13. Ashamed					
14. Inspired					
15. Nervous					
16. Determined					
17. Attentive					
18. Jittery					
19. Active					
20. Afraid					

Appendix E

Regulatory Emotional Self-Efficacy scale (RESE)

How well can you:

	1 Not Well at All	2	3	4	5 Very Well
1. Express when good things happen to you					
2. Feel gratified over achieving what you set out to do					
3. Rejoice over your success					
4. Express enjoyment freely at parties					
5. Keep from getting dejected when you are lonely					
6. Keep from getting discouraged from strong criticism					
7. Reduce your upset when you don't get the appreciation you deserve					
8. Keep from getting discouraged in the face of difficulties					
9. Manage negative feelings when reprimanded by your parents or significant other					
10. Avoid getting upset when others keep giving you a hard time					
11. Get over irritation quickly for wrongs you have experienced					
12. Avoid flying off the handle when you get angry					

Appendix F

ERP-R

Emotional Regulation Profile-Revised

The purpose of this questionnaire is to determine how you usually react to different emotional situations.

You will find below sixteen real-life scenarios, for which various responses are suggested. For each scenario please choose the reaction(s) that most resemble(s) your own. Please choose one response.There is no right or wrong answer.

1. You've been driving around for more than 30 minutes looking for a parking space. When you finally find a free parking space, the driver of another car overtakes you and takes your place from right under your nose. Obviously that makes you angry!

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) You don't say a word but are furious inside.

b) You say to yourself that it's not that serious after all. You're trying to look for the positive angle, e.g. maybe you'll find a parking space closer to where you have to go.

c) You express your annoyance by repeatedly sounding your horn at the driver.

d) In this kind of situation, there is nothing like having a drink, a joint or any other relaxing substance to help you calm down.

e) You try to forget the incident by turning on your radio or by thinking positive thoughts to clear your mind.

f) You have always had difficulties in asserting yourself and you don't see what you could have done. You feel discouraged.

g) You open your window and politely mention to the driver that their behaviour is out of order. If they don't give you the space you'll leave without making a big deal of it. It's not worth the trouble!

h) You decide not to get mad about a parking space and drive into the first paying car park.

2. You just finished an important but particularly boring task that you kept postponing (e.g. repainting, spring-cleaning, a good deed, etc.). You feel satisfied and relieved about it. You're pleased with yourself.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) You don't manage to fully relax. Pretty soon, worries and/or uncompleted tasks fill your mind.

b) You tell or show your friends or relatives what you achieved today.

c) You sigh with relief and you grant yourself a relaxing moment.

d) You're quite satisfied but you can't help noticing the few negative details of your work (e.g. time spent on the task, small imperfections, finishing touches, etc.).

e) You savour the present moment. You contemplate your work and think about what a good job you have done.

f) You think that getting this work done was some kind of miracle. You usually don't manage to finish tasks that bore you and you think that you won't be able to do it again for a while.

g) You think back on the hours spent on the job. Thanks to your patience and perseverance you've reached your goal. Efforts are always rewarded!

h) You don't give yourself the time to rest and you undertake another task right away.

3. A close friend has asked you to do them a very big favour. They want you to deliver some documents to a future employer while they are abroad. Your friend calls you in a rage upon their return because the employer never received the documents and as a result they weren't hired. You had completely forgotten to do as you had promised! Your friend is terribly upset with you and you feel extremely guilty.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) You feel the need to talk to your close friends or relatives about what has happened and how guilty you feel.

b) You make lots of excuses and you go out of your way to find your friend another job. In the following weeks you go to extremes to make up for your unforgivable error: lots of invitations to restaurants, various gifts and thoughtfulness, etc.

c) You understand and accept that your friend is angry with you. It was a human error and your friend might have forgotten to do it as well. In any case, in the future, you will be more careful.

d) In order not to let your guilt eat away at you, you embark on a pleasurable activity.

e) You don't stop thinking about it and you blame yourself terribly.

f) You ask your friend how you can make it up to them and offer to help them find a new job.

g) You tell yourself that you're not much of a friend because you're not even able to do this simple favour. You don't know what you could do to make for it and it makes you feel depressed.

h) In order to alleviate your guilt, you relax through the use of various substances (e.g. alcohol, marijuana, medication, etc.).

4. The week before you are due to move in with your partner they decide to break up with you and end the relationship. This makes you very sad.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) The break up causes you a great deal of pain and you are broken-hearted. You see yourself as unlucky in love and feel helpless about it!

b) You take time to look after yourself and do things you enjoy doing.

c) You try to feel better through the use of various substances (e.g., food, alcohol, marijuana, medication).

d) You confide in a close friend; you need to speak to someone about how you feel.

e) You try to pull yourself together in order to get back on your feet (e.g. joining a sports club, Internet dating service, parties, etc.). You spend time clarifying your priorities to make sure that the next partner will be "the one".

f) You look at old photos and listen to sad songs.

g) You try to see the positive side of things. This break-up, however difficult, is an opportunity to make a new start and to do the things you did not have the time to do before and, eventually to meet someone better suited to you.

h) Although there is absolutely no chance that your partner will change their mind, you keep trying to get back together with them any way you can.

5. You have taken part in the latest draw of the national lottery, because there was a major jackpot was at stake. You are at a friend's house and you ask them if you can watch the results of the draw on TV, even though you are not very optimistic about the result. Excitement starts to rise when you notice, with amazement, that 4 out of 6 of your numbers have been drawn! You have won about US$1500.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation

a) You jump for joy; you express your excitement by repeatedly saying how lucky you are.

b) During the next few days, you consider what you are going to do with this money. You think about spending 10 days in a sunny place for your next holiday, going to an expensive restaurant, treating yourself to a day at a spa, etc.

c) You cannot fully enjoy the situation because other things come to your mind (e.g., problems with a relative, atmosphere at work).

d) You share your joy with your friends, you show them the winning ticket, and you call your family to announce the news.

e) You try not to show your emotions; you keep it to yourself because it looks bad to get carried away in front of people. Besides, you don't want your friends to be jealous of you.

f) You feel happy and you celebrate with champagne (for example). It's not every day you win almost a month's salary without doing anything!

g) You think that what you won is ok. However, you can't help thinking that you were so close to winning the major prize! You may also think that this money will not solve your personal problems and that you will be obliged to treat your friends to a nice outing; which would stop you from enjoying all of your win yourself.

h) You think it's too good to be true. Today's luck cannot last forever. You already start to anticipate possible problems in the future.

6. You have gone with your partner to a party, which they were reluctant to attend. During the evening you notice, from a distance, that your partner is talking to someone of the opposite sex. Each of them seems very interested in what the other is saying: they are looking at each other intensely and laugh together several times. Given that your partner only came to the party reluctantly and that they have now become animated and enthusiastic, you start to feel very jealous!

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) You watch them out of the corner of your eye. The situation makes you feel uncomfortable but you don't let it show.

b) Instead of getting annoyed/angry, you decide to think about other things and to enjoy the party (e.g., you start talking to people, you go for a dance, etc.).

c) You express your jealousy to your partner without losing your temper. You tell them that you feel uncomfortable when they have quite so much fun with someone else.

d) You're engulfed by a wave of anger and as soon as you get the opportunity, you get angry with your partner.

e) In order to forget what you're seeing and to calm down, you go straight to the bar and spend the rest of the evening drinking.

f) You consider the different options for coping with this problem. You plan the strategy you're going to use to make sure this situation doesn't happen again.

g) You feel sad and abandoned. You think that your partner will eventually find someone more interesting and more desirable than you. What can you do anyway?

h) Despite your jealousy, you consider it important that your partner enjoys themselves and especially when they are not doing anything wrong. By giving your partner some space, they will be in a good mood when you both get home!

7. You spend a romantic weekend with your partner. The setting is wonderful. Your partner is on great form and you feel particularly happy!

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation

a) Despite the weekend being very pleasant, you cannot help resenting the few negative details that prevent your break from being perfect.

b) You try to enjoy the moment fully and put everything else out of your mind.

c) The weekend is perfect. It's too good to be true. You dread it all coming crashing down when you get home.

d) You have a great time and are not afraid to express your joy by laughing, joking, hugging your partner, etc.

e) Once on your own after the weekend, you reminisce of the happy time together, and of the things that make your relationship so precious.

f) You are having a good time, but for various reasons (e.g. fear of making a fool of yourself, it's not your style, guilt, etc.) you try not to get too carried away by your emotions, and therefore try to contain your happiness.

g) Over the following few days you share the memory of this good time with your family (or write it up in your diary).

h) The weekend is perfect. However, you struggle to completely forget your personal concerns (e.g. work, family, etc.).

8. You have to give a presentation to a large audience. You have done this exercise previously and it did not go very well. You received a great deal of criticism about your presentation. The very idea of making another presentation in public in a few days' time terrifies you.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) You try to distract yourself by embarking on an activity you enjoy. You have done all the preparation for your presentation and you'll see how things go when you come to doing it.

b) You can't stop thinking about it, you focus on what might go wrong and you stress right up until the delivery of the presentation.

c) You confide in the people around you, telling them of your fears and seeking their support and/or advice.

d) You draw up a plan of action so that you have every chance of things being a success. You identify the problem and envision the various solutions that will enable you to feel surer of yourself (rehearsal, relaxation, information about ways of improving your presentation).

e) You tell yourself that you'll never be able to deliver a good presentation and you feel like a loser.

f) On the days leading up to the presentation, you use some relaxing substances (e.g. alcohol, marijuana, medication, etc.) to help reduce your anxiety.

g) You try to see the positive side of the situation: this is good practice for you and even if things go wrong, it's not the end of the world!

h) Since you have been told about doing the presentation, you have been overwhelmed by stress. It's paralysing you and stopping you from working on your presentation. If it were possible, you would find an "excellent reason" to prevent you from giving the presentation.

9. During the last day of your holiday abroad, you go out for a walk with friends. After a few hours walking, you come across a waterfall entirely by chance. The scenery is magnificent and wild: water, greenery in abundance, sunset, sounds, etc. You are completely dazzled by the splendour of the landscape.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) The scenery is peaceful; although it's a pity that your feet are hurting, that it's a little bit chilly, or that there are mosquitoes. These petty drawbacks prevent you from fully enjoying the circumstances.

b) You express your delight and admiration in your own way (e.g. you express your ecstasy, you shout out loud, you shed a tear, you jump into the waterfall, etc.).

c) The scene is magnificent, but you contain your emotions. You'd rather show self-control in public.

d) During the next few days, you enjoy thinking back on the splendour of the place and/or looking at your photos again.

e) You share your emotion with your companions. Over the next few days, you recommend this place to everyone around you.

f) The fun is spoiled by the thought that it is the last day of your holiday, and that it will be a long time before such a moment happens again.

g) You allow all your senses to fully take in the place so that you can fully enjoy this moment.

h) The setting is gorgeous, but on the way back home you still think about the evening meal to prepare and/or the prospect of going back to work tomorrow.

10. You have to present a major project into which you have put a great deal of work. On the morning of your presentation, you are told that your presentation has been postponed and that a rival co-worker will present their project instead. This piece of news makes you particularly angry.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) You go directly to your co-worker's office and express your anger and come straight out again very annoyed.

b) You deliberately launch yourself into an activity that has nothing to do with the situation so that you can cool down. That way you won't do anything rash.

c) You look at the situation as a problem needing a solution. You draw up a plan of action that will enable your work to be recognised and/or to prevent it happening again.

d) You say nothing; you sometimes have problems in asserting yourself in this type of situation. It all makes you feel very weary.

e) You mull things over: why is your co-worker capable of being so opportunistic and spiteful towards you? Without actually taking any action, you imagine ways of taking your revenge on them.

f) You defuse the situation and/or try to learn something from it. Next time it'll be your turn!

g) When you get home, you consume various substances (alcohol, marijuana, medication, etc.) to relieve the stress.

h) You ask your co-worker to explain their actions. You tell them politely but firmly that you are unhappy about it, and then you allow them to tell you their point of view.

11. As the result of restructuring in your company, you are transferred to a new department 10 km from where you used to work. This upsets you, because over the course of time, you had built up a really close relationship with your co-workers and some of them had even become good friends.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) Your sadness turns into resentment against your company, and even against your former co-workers because they have been luckier than you. Your bad mood is noticeable.

b) You need time to forget your old job. But you think about it often.

c) You force yourself to look directly on the positive side of things (e.g. new people to meet, new career prospects, etc.).

d) You try to find comfort in drinking, smoking, taking medication, even drugs.

e) You tell the people around you about how sad you are and seek comfort from your friends.

f) You try to find a solution to the problem. If it is impossible to get your old job back, you take positive action (e.g. conversations, invitations to dinner, etc.) to improve and make the most of your new work situation.

g) You immediately try to resume doing things you enjoy, things that give you brief moments of pleasure.

h) Out of all the people in your team, it had to happen to you (again!). You feel unmotivated and can't find the energy to respond.

12. After months of relentless work, you have at last obtained the diploma or promotion you were dreaming about. It wasn't easy and you have done really well to have got this far - you are very proud of yourself. Relatives and friends have organised a party in your honour.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) During the party you cannot prevent other thoughts from coming into your mind (e.g. dread regarding your new status, personal concerns, etc.).

b) Over the next few days, you frequently think back on your success, the efforts and personal merit you have demonstrated, the pride of certain of your relatives, your prospects for the future, etc.

c) Even though everybody is congratulating you, you don't think that you deserve it. It was probably a stroke of luck and may not happen again.

d) You are proud of yourself and allow yourself to show it (e.g. shouts/tears of joy, gestures of victory, etc.).

e) In spite of the pleasure of having been successful, a part of you can't help thinking that you could have done better.

f) It is your hour of glory and you enjoy it fully. You have worked hard, and you do deserve this praise.

g) You are proud of yourself but for various reasons (e.g. fear of making a fool of yourself, modesty, reserve, etc.) you hold back from expressing your pride and fully celebrating your success.

h) During the next few days you tell everyone around the good news and share your success with your family and friends.

13. You happen to meet an old classmate whom you haven't seen for a long time. They invite you to pay them a visit the following week. You find they live in a magnificent apartment, while you are struggling in a tiny place. You feel jealous.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) You think you are really unlucky and feel depressed about it. You say to yourself that no matter what you do, you'll never make it to this standard of living.

b) To overcome your jealousy, you do something that you enjoy and/or that makes you feel better about yourself.

c) Once you get home, you mull over your situation. You feel the gap between their life and yours is unfair.

d) You're going to do everything you can to get a place like that. You draw up a plan of action and stick to it.

e) Once you get home, you seek comfort from your partner or a friend. You tell them what you have experienced and what you feel about it.

f) You are unable to stop your jealously from showing. During the conversation, your jealousy prompts you to throw out a few barbed comments.

g) To get over your jealousy and the stress it has caused, you allow yourself to consume a few relaxing products (alcohol, marijuana, medication, etc.).

h) You were pleased to see your old friend again. Even though your apartment is not as luxurious, you are happy for them. You are also sure that one day you too will be able to have a lovely place of your own. In the meantime, you tell yourself that there are other sources of happiness in your life that are just as important.

14. Today you are taking part in a morning of presentations going through the results of your company. There are a number of you due to present on stage in front of the projection screen. You hate this type of situation. You feel that all of your colleagues are better, more interesting and more at ease than you are. After your presentation, you return to sit down in the audience. Just in front of you, two of your colleagues who didn't see you sit down, whisper to one another, "just as well Eric is a good presenter, it makes up for the one before (i.e. yours)." to which the other person agrees, smiling. You feel yourself blushing with shame.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) To ensure this never happens again, you draw up a plan of action to follow for your next presentation. You plan stages to get you to the point of making a good presentation (content, attitude, posture, etc.).

b) You go away saying nothing. You feel like a loser. Unfortunately, there's nothing you can do to change the situation, giving presentations is simply not your "thing".

c) You sit there behind them, without saying a word. You mull over what you have just heard. On the one hand, you think they may be right. But on the other, you're really angry at them. You replay the scene repeatedly in your head, wondering how you can put them in their place, how you can regain your honour, etc.

d) You confide in a close friend and explain just how ashamed you are to have made a fool of yourself in from of all your colleagues.

e) In the days that follow, you try to avoid your co-workers.

f) To get rid of this feeling of shame, you use substances to help you unwind (alcohol, marijuana, medication, etc.).

g) Following on from this rather unpleasant moment, you feel you want to forget about it and so you do something you enjoy.

h) It's true that your presentation was not a total success. Nevertheless, you try to see the positive side of things. For you it was something new, you learnt something from it and will make sure you are better at it next time.

15. A friend of yours has just won a fantastic trip for two people to a paradise island. They ask you if you would like to go with them. You actually need a holiday, and you are extremely grateful.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) Even though you are pleased with this offer, your current preoccupations (e.g. personal or job-related concerns, stress, etc.) prevent you from taking advantage of it right now.

b) You allow yourself to show your gratitude and affection (e.g. thanks, hugs, invitation to a restaurant, etc.).

c) Even before you leave, you are already dreading coming back to reality. This week away will soon be gone, and you will certainly not have such a good holiday again for ages.

d) You fully enjoy the offer.

e) You are very grateful to your friend. However, over the next few days, you can't help thinking of certain negative features that prevent you from being entirely happy (e.g. this is not really the place you would have chosen, the dates oblige you to reorganise your schedule, you will have to pay your friend back, etc.).

f) You think how lucky you are to have such a good friend, and you realise that this offer strengthens your friendship. You start to anticipate the pleasant things you will be able to do during this trip.

g) You tell your friends and family about the trip, and you praise the generosity of your friend.

h) You wish you could fully express your gratitude, but various reasons (e.g. embarrassment, fear of making a fool of yourself, shyness, etc.) prevent you from being demonstrative.

16. After routine medical tests, your doctor tells you that you need to have an operation. Your health is not in direct danger, but if you do nothing, the situation could worsen in the near future. Even though your doctor is confident about the operation, it is quite a serious one and you are frightened by it.

From the following options, please mark in the response sheet the reaction(s) that most accurately reflect your reaction(s) to this type of situation.

a) You feel the need to talk about this operation with friends and family or with people who have already undergone the same sort of surgery.

b) You cancel the operation. You'd prefer not to be operated on for the time being; you've lived like that for years, so why have an operation now?

c) The prospect of an operation depresses you, and you are afraid of what might happen. You feel as though fate has dealt you a bad hand and there is nothing you can do about it.

d) You try to put things in perspective by telling yourself that people have operations every day and the risk of anything going wrong is really small. You also remind yourself of the major benefits for your health.

e) You can't help thinking about the operation and imagine everything that could go wrong.

f) You try to stop thinking about it until the day of the operation. As soon as the fear returns, you try to think of something else by launching yourself into activities to take your mind off it.

g) You use substances (e.g. alcohol, medication, drugs, etc.) to help you relax, as well as reduce your stress and fear levels.

h) You look at the problem logically and envisage the various solutions. Having an operation is the best solution. You set milestones to achieve before and after the operation, so that everything goes well.

Thank you for your participation

Appendix G

Mood Induction Experiment Script

- BASELINE (1ST PANAS)
  - *Please fill out this questionnaire based on how you are feeling right now. You will be asked to complete this questionnaire several times throughout the hour.*

- Show 1st clip
  - *Please watch the following video. You will be asked to answer some questions about it later on.*

- PANAS EMOTION 1
  - *Please fill out this questionnaire based on how you are feeling right now and I will come see you in a few moments*
  - **Time 1 minutes from the time they start the questionnaire**

- PANAS EMOTION 2
  - *Please fill out this questionnaire once again based on how you are feeling right now and I will come see you in a few moments*
  - **Time 1 minutes from the time they start the questionnaire**

- PANAS EMOTION 3
  - *Please fill out this questionnaire one more time based on how you are feeling right now and I will come see you in a few moments*
  - **WHEN THEY FINISH…CONTINUE WITH MATH PROBLEMS**

- Distraction task
  - *Please complete the following math problems*
  - **Let them finish**

- BASELINE (1ST PANAS)
  - *Please fill out this questionnaire based on how you are feeling right now. You will be asked to complete this questionnaire several times throughout the hour.*

- Show 2nd clip
    - *Please watch the following video. You will be asked to answer some questions about it later on.*

- PANAS EMOTION 1
    - *Please fill out this questionnaire based on how you are feeling right now and I will come see you in a few moments*
    - **Time 1 minutes from the time they start the questionnaire**

- PANAS EMOTION 2
    - *Please fill out this questionnaire once again based on how you are feeling right now and I will come see you in a few moments*
    - **Time 1 minutes from the time they start the questionnaire**

- PANAS EMOTION 3
    - *Please fill out this questionnaire one more time based on how you are feeling right now and I will come see you in a few moments*
    - **WHEN THEY FINISH…CONTINUE WITH MATH PROBLEMS**

ASSESS IF RETURN TO BASELINE (PANAS)

- *Please fill out this questionnaire based on how you are feeling right now. You will be asked to complete this questionnaire several times throughout the hour.*

IF NOT BACK TO BASELINE OF WHEN THEY CAME IN – WATCH FRIENDS VIDEO

DEBRIEF & GIVE DEBRIEFING SHEET

Appendix H

McGill Classified Advertisement

Undergraduate Participants Needed

The Hearth Research Team in the department of Educational and Counselling Psychology at McGill is looking for McGill undergraduate students between the ages of 18-25 who are willing to complete an online questionnaire about the regulation of positive and negative emotions. Participants will be asked to complete an online questionnaire that takes approximately 1 hour to complete. Participants will be compensated 10$ for their time. If you are interested please contact emotionregulationstudy.mcgill@gmail.com

Appendix I

Email to Participants for Participants in Online Study (for previous participants)

E-mail Subject line: EMOTION REGULATION OF POSITIVE AND NEGATIVE EMOTIONS – INVITATION TO PARTICIPATE IN AN ONLINE STUDY

You participated in a study of stress and coping in (MONTH) with our team and agreed at that time to be contacted for possible follow up studies, this is how we obtained your email.

We are now contacting you to invite you to participate in an online study on emotion regulation of positive and negative emotions. You will be compensated $10.00 for your participation in this online study.

This study will examine individuals' processing and reaction to negative and positive emotions. The online questionnaire will take approximately 60 minutes to complete. No identifying information, other than your email, will be requested.

For further information about this study or to access the online questionnaire, please click the link below:

LINK TO ONLINE SURVEY

Prior to beginning the questionnaire, further information about the study will be provided and you will be asked to give your consent. Please forward any questions or concerns to the confidential email address, emotionregulationstudy.mcgill@gmail.com. This email address has been established for the sole purpose of this study and is only accessed by myself and my supervisor Dr. Nancy Heath.

Thank you,

Melissa Stern, M.A.
McGill University, Project Coordinator
Ph.D. Candidate

Appendix J

Consent Form for Online Study (for classified recruitment)

E-mail Subject line: EMOTION REGULATION OF POSITIVE AND NEGATIVE EMOTIONS – INVITATION TO PARTICIPATE IN AN ONLINE STUDY

Thank you for your interest in participating in an online study on emotion regulation of positive and negative emotions. You will be compensated $10.00 for your participation in this online study.

This study will examine individuals' processing and reaction to negative and positive emotions. The online questionnaire will take approximately 60 minutes to complete. No identifying information, other than your email, will be requested.

For further information about this study or to access the online questionnaire, please click the link below:

LINK TO ONLINE SURVEY

Prior to beginning the questionnaire, further information about the study will be provided and you will be asked to give your consent. Please forward any questions or concerns to the confidential email address, emotionregulationstudy.mcgill@gmail.com. This email address has been established for the sole purpose of this study and is only accessed by myself and my supervisor Dr. Nancy Heath.

Thank you,

Melissa Stern, M.A.
McGill University, Project Coordinator
Ph.D. Candidate

Appendix K

Consent Form for Online Study

EMOTION REGULATION OF POSITIVE AND NEGATIVE EMOTIONS

Thank you for your interest in participating in this online study. This questionnaire will take approximately 60 minutes of your time. You will be compensated $10.00 for your participation in the online study. The purpose of this project is to investigate the way in which individuals process and react to positive and negative emotions. Below you will find additional information regarding this study. Please forward any questions or concerns to the confidential email address that has been established for the sole purpose of this study: emotionregulationstudy.mcgill@gmail.com.

Confidentiality: Your participation will be kept confidential. All responses will be kept in a password protected file stored within a secure computer accessible only by myself and my advisor, Dr. Nancy Heath (Nancy.Heath@mcgill.ca). All data will be coded to ensure your confidentiality. Your data will be used in the development of scholarly works that will be presented at various academic conferences, submitted to academic journals for publication, and used as part of my own dissertation. At no point during the dissemination of the results of this study will any identifying information be released.
Potential Risks: While there are no anticipated risks involved in participating in this research project, some participants might be sensitive to, or uncomfortable with, some of the questions. You are not obliged to answer any questions you do not want to answer. This survey will be completed confidentially. However, in order to pick up your compensation, you will use your participant ID number. You can ask to have your submitted questionnaire withdrawn at any time.
Study Objective: Your participation in the present study will increase our understanding of the manner in which individuals process and react to positive and negative emotions.
This study has been given the reference number 454-0515, demonstrating that it has been approved by the Research Ethics Board at McGill University (Montreal, QC). If you have any questions or concerns about your rights or welfare as a participant in this research study, please contact the McGill Research Ethics Officer at (514) 398-6831 and/or at the following email address, Deanna.Collin@mcgill.ca.
While it is recommended that you print or save a copy of this consent form, an electronic copy can be requested from the following email address: emotionregulationstudy.mcgill@gmail.com. Thank you very much for your time.

By proceeding to the following page, you have provided consent to participate in the study.

Melissa Stern, M.A.
McGill University, Project Coordinator
Ph.D. Candidate

Appendix L

Debriefing Sheet

Thank you for participating in our survey on emotion regulation of negative and positive emotions

The information you provided will help us understand how young adults process and react to negative and positive emotions.

Here are some resources that may be helpful to you:

McGill Services	**Mental Health Support**
McGill Mental Health Service: (514) 398-6019	Tel-Aide Montreal: (514)-935-1101
McGill Counselling Services: (514) 398-3601	Suicide Action Montreal: (514) 723-4000
McGill Nightline (6pm-3am, daily) (514) 398-6246	Project 10 (listening line for LGBTQ individuals): (514) 989-4585
Sexual Assault Centre of McGill Students' Society: (514) 398-8500	Déprimés Anonymes (listening line for individuals with depressive symptoms): (514) 278-2130

Stress Websites

Coping with stress: http://www.helpguide.org/mental/stress_management_relief_coping.htm

McGill stress workshops: http://www.mcgill.ca/counselling/workshops/wellness

Self-Injury Outreach and Support: http://www.sioutreach.org/about-us

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If you are interested in knowing more about this study or the research conducted by the **Heath Research Team,** please visit our website:

http://heathresearchteam.mcgill.ca/

HEATH RESEARCH TEAM

McGill University, Faculty of Education

Tel.: (514) 398-1232

Emotionregulationstudy.mcgill@gmail.com

Appendix M

Email for Emotional Inducement Study

E-mail Subject line: INVITATION TO PARTICIPATE IN STUDY ON THE EXPERIENCE OF POSITIVE AND NEGATIVE EMOTIONS

Thank you for participating in our online study on emotion regulation of positive and negative emotions. Please let us know when would be the best time to stop by our research office to pick up your compensation.

We are also looking for participants to participate in a follow up face-to-face study on the reaction and processing of positive and negative emotions. The study takes approximately one hour to complete and takes place in our office in the Education Building (3700 McTavish). You will be compensated $15.00 for your participation in this study.

Please let us know if you would be interested in participating in this part of the study by emailing us at our confidential email address, emotionregulationstudy.mcgill@gmail.com. This email address has been established for the sole purpose of this study and is only accessed by myself and my supervisor Dr. Nancy Heath.

Thank you,

Melissa Stern, M.A.
McGill University, Project Coordinator
Ph.D. Candidate

Appendix N

Consent Form for Emotional Experiences Study

CONSENT TO PARTICIPATE IN RESEARCH

You are being asked to participate in the study on **THE EXPERIENCE OF POSTIVE AND NEGATIVE EMOTIONS.** This research study is being conducted by Melissa Stern, a researcher in the Department of Educational and Counselling Psychology at McGill University. The study has been reviewed by McGill's Research Ethics Board. The study is focused on the differences in experiences of positive and negative emotions, as well as the relationship between such differences to various styles of coping (both healthy and unhealthy). The study takes approximately 60 minutes to complete. You are in no way obligated to engage in the study. As part of this study, you will be presented with situations that will elicit positive and negative mood states. During the project session, you will be asked to watch a sad and happy YouTube clip. You will also be asked to complete a questionnaire to assess your emotional reaction to these tasks. You will be compensated $15 for your participation in this study.

Your participation in this experiment is completely voluntary. You have the right to refuse to participate and the right to withdraw from the study at any time, without consequence. Your performance in this study is in no way connected to my academic grades or your performance in school.

This study is being conducted for research purposes only and your identity will remain confidential. All raw data obtained for this study will be safeguarded in a locked cabinet and electronic data will be password protected. Only those authorized (the primary investigator and project supervisor) will have access to the data obtained from the study. The results of this study may be used in future presentations or for research publications. In all instances, only group data will be reported. Data will be preserved for 7 years following any publication, as specified by McGill University's Research Ethics Board, and then disposed of by shredding the questionnaires and deleting any computer files containing electronic data.

Please sign below if you agree to participate in this study.

Name (please print): _____

Date: _____ Signature: _____

In the event that you have any concerns or questions about this study, you may contact Melissa Stern at emotionregulationstudy.mcgill@gmail.com or her research supervisor, Dr Nancy Heath at (514) 398-3439. If you have any questions or concerns regarding your rights or welfare as a participant in this research study, please contact the McGill Ethics Manager at 514-398-6831 or Deanna.Collin@mcgill.ca