Non-Suicidal Self-Injury: Attachment in Specific Relationships and Experiences of Emotion and Coping

by

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December, 2013
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Abstract

Non-suicidal self-injury (NSSI) presents as a significant challenge for the health system in Western countries like Australia. With the prevalence believed to be on the rise in clinical and non-clinical populations, there has been a recent surge in the theoretical and empirical literature investigating risk factors and correlates of self-injury, with the notion that this may guide intervention. Of the constructs put forward, theories relating to attachment, affect regulation, and coping appear to hold promise for understanding NSSI. The current research project consisted of two separate yet interrelated studies investigating the role of these variables in the development and maintenance of NSSI behaviours.

The first study consisted of a cross-sectional survey examining the associations between NSSI, six facets of emotion regulation, alexithymia, and attachment-related anxiety and avoidance in four specific relationships (mother, father, best friend, and romantic partner). An online questionnaire was completed by 545 participants with a mean age of 24.90 (SD = 7.89). Results revealed that NSSI had significant zero-order correlations with six facets of emotion dysregulation, alexithymia, and attachment-related avoidance and anxiety across all relationships. Logistic regression revealed that only two attachment-related variables (Attachment Anxiety with Father and Attachment Anxiety with Romantic Partner) and one emotion regulation factor (STRATEGIES) uniquely predicted NSSI behaviours. Path analysis revealed that difficulties in emotion regulation mediated the relationship between NSSI and attachment-related anxiety and avoidance, for most (but not all) relationship domains. STRATEGIES mediated the relationship between NSSI and other facets of emotion regulation.
To examine these constructs further, a second study utilized ecological momentary assessment methods to investigate moment-to-moment experiences of affect and coping in individuals with and without recent NSSI behaviours. A total of 38 individuals with a mean age of 22.21 (SD = 5.27) participated in the study by completing baseline measures and then using their mobile phones to respond to a questionnaire at random intervals five times per day for a two week time period. Multilevel modeling revealed that individuals in the NSSI group experienced activated and deactivated negative affect more frequently, and less often reported activated and deactivated positive affect. They also reported greater fluctuations in affect over time. Individual variability in affect was also predicted by differences in emotion regulation, alexithymia, and attachment-related anxiety and avoidance. Those with NSSI behaviours tended to report less frequent use of engagement coping strategies when experiencing negative affect than those in the comparison group. Although there was individual variability in outcomes, disengagement or avoidant coping led to an increase in negative affect at the second time point. Variables such as NSSI, alexithymia, and attachment-related avoidance and anxiety moderated the relationship between coping and negative affect.

The results and limitations of these studies are discussed, in addition to the implications of the current findings for future research and clinical practice with individuals with NSSI behaviours.
Acknowledgements

There are a number of individuals deserving of acknowledgment for their assistance and encouragement during the completion of this project. To my research supervisor, Dr Helen Mildred, your experience and knowledge as both a clinician and an academic has been instrumental in allowing this project to be realized. Thank you for guiding me through what appeared a daunting process, and showing confidence in my abilities at times when I felt unsure. Your wisdom has been invaluable, and your humor and warmth tremendously appreciated. I am immensely grateful to have had the opportunity to work closely with an individual I have such respect for. To Dr Matthew Fuller-Tyszkiewicz, thank you for your valued consult and statistical expertise. I am grateful for your patience and generosity with your time. Your support has allowed me to complete a number of complicated analyses with relative confidence.

On a personal note, I would like to thank my parents, Liz and Andre Burgat, for continuing to encourage my professional pursuits, and for persevering with me during this lengthy undertaking. I owe my achievements to your unwavering support. Thank you also to my fellow doctoral students for sharing in this journey. Congratulations on your achievements. I have great respect for the professionals you have become. To my partner and colleague, David Hallford, thank you for being a sounding board for ideas, and for contributing valuable research knowledge. I am extraordinarily proud of our accomplishments. In many ways you have enriched this degree for me, and you continue to motivate and inspire me. I am profoundly grateful.

Finally, I also must thank the individuals who participated in my studies. This project is a reflection of their experiences, and without their invaluable contribution it would not exist.
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Chapter 1: Overview

Intentional self-injurious behaviours or acts that are harmful to the self in the absence of suicidal thoughts, are complex and concerning. Although self-laceration or cutting appears to be the most common form of self-injury (De Leo & Heller, 2004; Jacobson & Gould, 2007; Patton et al., 1997), many other behaviours are also reported, ranging from self-burning to scrubbing one’s skin with dangerous cleaning products. Associated with a variety of psychiatric presentations, data from overseas suggests that up to 40% of adolescents and 20% of adults in clinical settings engage in self-injurious behaviours (Briere & Gil, 1998; Meuhlenkamp, 2005). While self-injury was once considered to be a behaviour largely restricted to cohorts of individuals with serious psychopathology, recent research suggests that it is also common in nonclinical populations (Hallab & Covic, 2010; Jacobson & Gould, 2007; Meuhlenkamp, 2005; Swannell, Martin, Page, Hasking, & St John, 2014). Incidence of self-injury appears to be higher in adolescence, with previous reviewers reporting pooled prevalence rates of 17.2% among adolescents, 13.4% among young adults, and 5.5% among adults (Swannell et al., 2014). In adolescence, literature suggests a 12-month prevalence rate of 5.1% in Australian (Patton et al., 1997) and approximately 19% across international samples (Meuhlenkamp, Claes, Havertape, & Plener, 2012). Including individuals from all age ranges, scholars estimate a lifetime prevalence rate of 8.1% in Australia (Martin, Swanell, Hazel, Harrison, & Taylor, 2010). Given the relatively high incidence of self-injury in both clinical and non-clinical populations, and associated findings that those who engage in non-suicidal self-injury are at heightened risk of suicide (Jacobson, Meuhlenkamp, Miller, & Turner, 2008; Nock,
Joiner, Gordon, Lloyd-Richardon, & Prinstein, 2006), this range of behaviours present a significant challenge for the health system in Western countries such as Australia.

The last 10-15 years have seen a growth in psychological research aimed at gaining an informed understanding of the factors that lead to the development and maintenance of self-injurious behaviours, contributing to the advancement of evidenced-based intervention methods. While expanding knowledge in the area has been integral to informing clinical practice, there are still a number of gaps in the available literature that require further examination. The current series of studies seeks to contribute to existing research by addressing some of these limitations.

After this overview, Chapters 2 through 4 include a narrative review of some of the existing literature and theory relating to non-suicidal self-injury. To provide a contextual overview, issues pertaining to the definition and classification of self-injury are discussed, and literature relating to self-injury methods, prevalence, and comorbidity are examined. Following this, the major psychosocial models that have been put forward to explain the etiology of self-injurious behaviours are outlined. This review specifically focuses on theories relating to attachment, emotion regulation and coping, discussing and evaluating the existing theoretical and empirical literature that provide a framework in which to understand self-injurious acts. The research surrounding attachment, emotion regulation, and coping in relation to non-suicidal self-injurious behaviour is appraised and critiqued, and areas for further research are highlighted.

As discussed within these introductory chapters, although a plethora of factors have been proposed to explain the development and maintenance of non-suicidal self-injury, the relative importance and functional relationships between psychological and interpersonal contributors has not been adequately established. In addition to this, a
concern plaguing the literature in this area relates to the fact that the vast majority of research is cross-sectional in design, indicating a paucity of studies that track risk factors and correlates of self-injury over time, as with real-time ecological momentary assessment and/or longitudinal methodology. In an effort to assist in addressing concerns such as this, two distinct yet interrelated research studies were proposed and conducted.

The first of these studies includes a cross-sectional survey study aimed at examining the associations between non-suicidal self-injury, facets of emotion dysregulation, alexithymia, and specific attachment relationships. The study focused on examining the relative importance of factors, as well as testing theoretical pathways between them. Study 1 reports on the relationship between emotion dysregulation and self-injury, and suggests that interactions with key attachment figures may influence processes involved in moderating and coping with distress. Chapter 5 provides an overview of the aims, research questions and hypotheses for Study 1, as well as a summary of the methods and results. Chapter 5 also includes a discussion of the findings for Study 1, their implications for future research and practice, as well as the limitations of the study.

Building on the foundations from Study 1, the second research study aimed to further explore the influence of emotional processes on self-injury, by closely examining the day-to-day experiences of individuals with self-injurious behaviours. Specifically, Study 2 examines moment-to-moment differences in the way individuals with and without a recent history of self-injury experience affect and manage stress, and explores the outcomes associated with the implementation of coping strategies. This involved the use of ecological momentary assessment methodology and multilevel modeling procedures to test existing theories relating to coping and
emotion regulation in individuals with self-injurious behaviours. Chapter 6 outlines the specific aims, research questions, and hypotheses for this study, as well as the method and results. This chapter also provides a discussion of the findings for Study 2, limitations, clinical implications, and areas for future research. Lastly, Chapter 7 includes a general discussion for the two studies.
Chapter 2: Non-Suicidal Self-Injury

Self-injury refers to the deliberate harming of one’s body, leading to damage or destruction of tissue. There are numerous methods of self-injury, and acts may vary in terms of severity and/or lethality. Accurate estimates of incidence are difficult to obtain, partially as a result of inconsistencies in terminology and classification of behaviours, but also due to the fact that many individuals who engage in self-injury may not come to the attention of medical and/or mental health services. Despite this, self-injury is increasingly being recognised as a significant concern for countries such as Australia, leading to a rise in the amount of empirical research aimed at understanding this complex range of behaviours.

This chapter introduces the extant literature regarding self-injurious behaviours, particularly providing a basis for further examination of the role of attachment, emotion regulation, and coping. It begins with a discussion of concerns associated with defining and measuring self-injury, and reports on known prevalence rates, common methods, and the presence of comorbidity in clinical populations. The chapter concludes with a discussion of the etiological understandings of NSSI.

2.1 Issues With Classifying Self-Injurious Behaviour

Psychological literature examining self-injurious behaviour has been plagued by the use of inconsistent terminology, leaving both academics and clinicians struggling to identify terms that are clear and accurate, whilst being sensitive to the complex and idiosyncratic nature of suicide-related thoughts and behaviours. A wide variety of terms have been used by authors to describe and classify behaviours that involve some form of self-destruction, and there is a diversity of opinion regarding
what sorts of behaviours belong under such headings. Debates exist regarding whether non-suicidal self-injurious behaviour can be considered distinct from self-injurious behaviour with suicidal intent, and whether indirect forms of harm (i.e. reckless driving or binge drinking) and/or culturally sanctioned behaviours (i.e. body piercing and tattooing) should be included within definitions. In an effort to elucidate this area of confusion, the initial portion of this review will consider the range of terminology and definition of constructs that exist within the self-injury literature. The implications of this lack of clarity for research and practice are also considered.

2.1.1 Terminology and Definitions for Non-Suicidal Self-Injury

Despite decades of research in the area, there remains no generally accepted nomenclature to refer to the range of behaviours commonly associated with self-harm. Across the extant literature an estimated 33 different terms have been used to categorise acts that are destructive to the self (Favazza, 1996). Among these, the most popular constructs are ‘deliberate self-harm’ and ‘non-suicidal self-injury’, while authors occasionally refer to ‘self-mutilation’. While decisions regarding which term to adopt in practice may appear somewhat superficial and can relate to personal preferences, norms within regions or countries of practice, or concerns with being perceived as non-judgmental and accepting when communicating with others, the issue has the potential to create a great deal of confusion among practitioners and researchers. Parallel to this, and potentially more concerning, is the observation that there exists a range of definitions that describe the behaviour very differently. Commonly cited definitions are described and critiqued below.

Walsh and Rosen (1988) define self-mutilation, or self-mutilating behaviour (SMB), as “deliberate, non-life-threatening, self-effected bodily harm or
disfigurement of a socially unacceptable nature” (p. 10). This term is somewhat out-dated and used infrequently today, and difficulties arise when it comes to operationalising this construct. Most notably, the term ‘non-life-threatening’ lacks clarity, given that commonly agreed upon forms of self-injury (such as self-laceration or cutting) can indeed become dangerous and life threatening if wounds are severe or not attended to properly. In addition to this, the term ‘socially unacceptable’ is problematic without further clarification, given the somewhat subjective and contextual nature of this issue. One may question, for instance, whether self-cutting is considered a form of self-mutilation in specific cases where it is seen to be socially acceptable within a certain cohort or subculture.

Hawton, Rodham, Evans and Weatherall (2002) appear to somewhat address one of the above concerns with the term ‘non-life-threatening’ by placing emphasis on the objective outcome of an act. They define deliberate self-harm (DSH) as “an act with a non-fatal outcome” (p. 1208), reasoning that it may involve initiated behaviour intended to cause harm, as well as ingestion of some sort of substance or object in a manner that “the person regarded as self harm” (p. 1208). Here Hawton and his colleagues highlight the importance of the idiosyncratic meaning behind a specific act or behaviour and stipulate that the behaviour must be intended to cause harm. This implies that an act must be somewhat purposeful. It appears from this definition, however, that unsuccessful suicide attempts can be categorised as deliberate self-harm, with these authors placing importance on the outcome of an act rather than the associated ideation or intent.

A more recent, and now more commonly used, term is non-suicidal self-injury (NSSI). Seeking to address many of the concerns associated with classification in this area, Nock and Favazza (2009) refer to NSSI as the “direct, deliberate destruction of
one’s own body tissue in the absence of suicidal intent” (p.9). These authors position NSSI beneath the umbrella of self-injurious thoughts and behaviours (SITB; see Figure 1 below), which they reason consists of “a broad class of experiences in which people think about or engage in behaviour that directly or deliberately injures themselves” (p.10). This definition for NSSI is similar to Gratz’s (2003) description of DSH as “the deliberate, direct destruction or alteration of body tissue, without conscious suicidal intent but resulting in injury severe enough for tissue damage to occur” (p. 192). While Gratz adopts the same DSH term as Hawton et al. (2002), like Nock and Favazza she highlights the importance of distinguishing between suicidal and non-suicidal behaviours, with emphasis placed on the conscious intent behind an act. Although not immediately clear how this notion of intent can be measured, Nock and Favazza describe suicidal intent as a construct comprising suicidal ideation, suicidal plans, preparatory acts, and suicidal attempts, reasoning that self-injurious behaviours should be classed as NSSI in the absence of these factors.

Figure 1. Nock and Favazza’s (2009) model of self-injurious thoughts and behaviours

Descriptions by Gratz (2003) and Nock and Favazza (2009) of behaviours that are both direct and deliberate, indicate that to be classified as either DSH or NSSI, an act must not be accidental, and there must not be intervening steps between the
behaviour and its negative consequence. This differs from the definitions provided by Hawton et al. (2002) and Walsh and Rosen (1988). The aforementioned definitions also differ with regard to the importance placed on whether acts are socially acceptable or not. While often discussed elsewhere by these authors, definitions provided by Gratz, Hawton et al., and Nock and Favazza make no explicit reference to whether culturally or socially sanctioned behaviours should be included or not in categories of NSSI or DSH. Research around these issues is discussed below.

2.1.2 Distinguishing Between Direct and Indirect Acts of Harm

As outlined above, one concern with the classification of self-injurious behaviour relates to the inclusion of indirect or abstract forms of self-harm. While it is generally accepted that direct methods of harming the self (i.e. cutting or burning one’s own skin) should be defined as self-injury, some authors also include indirect methods of harming the self (i.e. reckless driving, drug/alcohol abuse, risk taking, binge eating, and sexual promiscuity; Meuhlenkamp, 2005). The distinction here appears to relate to whether one should simply focus on the outcome of harm to the self, or whether emphasis is placed on the conscious intent behind an act.

A rationale for the inclusion of indirect methods of self-injury relates to the notion that there may be a qualitative overlap between direct and indirect methods of self-harm, whereby such behaviours may represent maladaptive attempts to regulate affect and/or cope with stressors in vulnerable individuals. Such assertions provide a theoretical understanding for the high rates of self-injury in individuals with eating disorder pathology (Muehlenkamp, Peat, Claes, & Smits, 2012).

Nevertheless, one may reason that the inclusion of indirect forms of harm may be somewhat confusing and unhelpful, leading to research and treatment that is
reductionistic and that lacks specificity. While it is appreciated that behaviours such
as cigarette smoking can indeed result in negative health outcomes, unless it can be
verified that this involves deliberate and intentional self-destruction, authors such as
Nock and Favazza (2009) reason that it may be an error to place these acts in the same
category as behaviours like self-cutting. While there may be overlap between the
precipitants and psychological processes surrounding forms of indirect and direct self-
injury, it may be too simplistic to assume that they should be categorised as one.

2.1.3 Culturally Sanctioned Behaviours

Another area of concern with the definition of NSSI, DSH or self-mutilation
relates to whether culturally sanctioned or socially accepted behaviours should be
included. Favazza (1996, 2009) highlights a number of culturally sanctioned forms of
self-injury, including the fact that body modification rituals and traditions exist in a
number of Eastern cultures. Favazza also reasons that there may be overlap between
the purpose of body modification rituals in Eastern civilizations and self-cutting in
Western society. Through Favazza’s discussion of the complex interplay between
culture and NSSI, the importance of taking into account context and history when
understanding NSSI is highlighted. Specifically, when determining whether an act can
be considered NSSI or not, one must take into account social practices (Nock &
Favazza, 2009). As such, Nock and Favazza (2009) reason that acts such as body
piercing and tattooing in Western cultures should remain distinct from NSSI.

While this distinction appears reasonable, the notion is somewhat problematic
when it comes to self-injurious behaviours within subcultures. With studies
suggesting that individuals may adopt NSSI behaviours as a result of modeling
(Deliberto and Nock, 2008), and that recent awareness of NSSI in peers appears to be
a predictor of NSSI in adolescents (Hawton, Rodham, Evans, Weatherall, 2002), it is evident that the influence of others may be an important factor in this debate. In a hypothetical scenario where a large peer group all report engaging in NSSI, the behaviour may be perceived as relatively normal or somewhat socially acceptable. If one is to adopt the view that NSSI only refers to socially unacceptable behaviour, then the behaviour of individuals in this peer group may not be considered particularly problematic or maladaptive, and intervention may not be a priority.

While not an easy concern to address, it may be important to distinguish between norms within subcultures, and those within an individual’s wider social community. As highlighted in previous definitions of self-injury it appears necessary to emphasise the explicit intention behind an act, to determine how it should be classified. Nevertheless, the subjective element associated with current definitions will remain until a more comprehensive classification system is put forward.

2.1.4 Distinguishing Suicidal and Non-Suicidal Behaviours

Finally, it is important to briefly discuss the aforementioned distinction between suicidal and non-suicidal behaviours. In the existing psychological literature, authors differ in their opinions regarding whether constructs should distinguish between acts performed with and without suicidal intent. Part of this issue is regional, with researchers from the United States historically discriminating between suicidal and non-suicidal forms of self-injury more consistently than scholars from Great Britain and parts of Europe, although this is not a universal trend.

A number of scholars have treated suicidal and non-suicidal self-harming behaviour as largely analogous, grouping them together under one construct (Hawton, Harriss, Sumkin, Bale, & Bond, 2004; Hawton, Rodham, Evans, Weatherall, 2002;
Hurry, 2000; Jacobson, Meuhlenkamp, Miller and Turner, 2008; Linehan, Armstrong, Suarez, Allmon and Heard, 1991). The Australian Institute of Health and Welfare (AIHW; Pointer, 2013), for instance, did not distinguish between non-suicidal and suicidal self-injury when reporting hospital prevalence statistics. This may be because of convenience and/or because they can be difficult to distinguish, particularly as retrospective reporting of intent may not be reliable. Some authors do not believe that it is necessary to examine these types of self-injury in isolation, asserting that it is the behaviour that is the key feature that requires intervention and treatment. Researchers may also group suicidal and non-suicidal behaviours together as there are no agreed upon clear and objective definitions to differentiate them. This approach is supported by research that indicates that individuals who engage in self-injury appear to be at increased risk of suicidal attempts and completion (Jacobson, Meuhlenkamp, Miller, & Turner, 2008; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Owens & House, 2002). Beyond this assertion, however, there appears little empirical support for combining suicidal and non-suicidal behaviours, and such grouping can lead to research lacking clarity, specificity and clinical utility.

The first attempt to classify acts of self-injury was done in 1938 by Karl Menninger. In his well-known book, Man Against Himself, Menninger (1938) viewed self-injury as an attempt to heal the self, whereby an individual may avert total suicide by substituting the damage or destruction of one body part or region. Menninger asserts that self-harming and suicidal acts have different purposes and are qualitatively distinct. In this way, self-harming behaviours may be more about life and a desire to cope and survive than about death or an attempt to die. A similar view has been adopted by a number of clinicians and academics today, with empirical research now available to support this perspective. Authors have highlighted the importance of
discriminating between suicidal and non-suicidal self-injury for methodological, theoretical and clinical reasons (Favazza, 1996; O’Carroll, et al., 1996). These and other scholars reason that it is ultimately simplistic and limiting to cluster non-suicidal and suicidal self-injury together. They provide evidence that non-suicidal and suicidal self-injury differ in terms of associated risk factors, intent, methods, lethality, reactions, chronicity, cognitions, aftermath, prevalence, and demographics (Brown, Comtois, & Linehan, 2002; Jacobson & Gould, 2007; Jacobson, Meuhlenkamp, Miller, & Turner, 2008; Muehlenkamp, 2005; Muehlenkamp & Gutierrez, 2004; Wichstrom, 2009).

Despite the contention that suicidal and non-suicidal behaviours are distinct, there can exist constraints when it comes to applying this to research and practice settings. As highlighted by Fliege, Lee, Grimm and Klapp (2009), the distinction between suicidal and non-suicidal self-injury is based on a criterion of intention that is very difficult to operationalize. Suicidal intent may be ambivalent, suppressed, or concealed for a variety of reasons. Specifically then, there can be practical difficulties with establishing whether any given self-injurious act is suicidal or not. There is a need, therefore, for a definition of non-suicidal self-injurious behaviour that can be applied to research and clinical practice settings.

2.1.5 The Implications of Lack of Clarity on Research and Practice

As highlighted throughout the above discussion, it is evident that there is a lack of clarity concerning terms, definitions and guidelines regarding self-injurious behaviours, which is inevitably problematic for the science of psychology, which seeks to produce reliable, valid and replicable research with a view towards generating improved clinical outcomes. This lack of clarity has not been assisted by
the inclusion of these behaviours as merely a symptom in the fourth edition of the American Psychiatric Association’s (2000) Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). While Section III of the DSM-5 includes NSSI as a condition worthy of further research (American Psychiatric Association, 2013), there remains confusion when it comes to classifying self-injurious behaviours regardless of psychopathology. It is argued by previous authors that the inability to agree on nomenclature and an operationalisable definition has complicated research, inhibited scientific advancement, and contributed to the existing lack of understanding regarding the behaviour (Meuhlenkamp, 2005; Nock & Favazza, 2009; O’Carroll, et al., 1996). In practice, diverse terminology and definitions result in clinicians not easily being able to communicate with one another about the presenting concerns of clients (O’Carroll, et al., 1996), which is troubling given the risk of harm associated with self-injury.

Whilst the aim of the current study is not to remedy all issues raised in the above review, it is important to select a term and an evidenced-based definition. For the current project the term non-suicidal self-injury (NSSI) has been adopted. This nomenclature has been chosen for the reason that it lacks the pejorative connotation characteristic of other terms such as ‘self-mutilation’. In addition to this, unlike ‘deliberate self-harm’, NSSI clearly and transparently conveys a non-suicidal quality that has been supported by past research discussed above. For the current project, NSSI will refer to the direct and deliberate destruction of body tissue in the absence of suicidal intent, and excluding behaviours that are widely sanctioned within an individual’s culture (such as tattooing or body piercing in Western cultures).
2.2 Tools for Measuring Non-Suicidal Self-Injury

Accurate and thorough assessment of NSSI is pivotal for researchers and practitioners, particularly where significant risk issues are involved. Despite this, there have been relatively few valid measurement instruments developed (Klonsky & Weinberg, 2009). This section provides readers with a very brief discussion and critique of available tools used to assess NSSI, including structured interviews and questionnaires.

Before proceeding, it should be noted that although previous authors have provided guides for assessing NSSI during unstructured clinical interviews (such as Walsh, 2007), these guidelines are not reviewed here. In addition to this, although a small number of measures have been designed to specifically assess the motivations behind NSSI and/or it’s functions for specific individuals (see Klonsky & Weinberg, 2009), these are also not discussed. Instead, the focus here is on instruments that provide information regarding NSSI behaviours.

2.2.1 Structured Interviews

Researchers and clinicians currently have access to two structured interviews that assess for NSSI. The first of these is the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007). This comprises 169-items to assess various aspects of suicidal and non-suicidal ideation and gestures. NSSI is defined by the authors as self-injurious acts performed without the desire to die. The tool provides clinicians and researchers with information regarding age-of-onset, methods, functions, frequency, severity, antecedents, concurrent substance use, social influence, impulsivity, medical treatment, and predicted future occurrences. It appears to have good psychometric properties (Nock et al., 2007), however as yet it
has only been evaluated on a single sample of 94 adolescents and young adults. A second tool is the Suicidal Attempt Self-Injury Interview (SASII; Linehan, Comtois, Brown, Heard, & Wagner, 2006). The SASII contains 31 items that assess self-injurious acts performed with and without suicidal intent. Assessment provides a detailed account of frequency, lethality, context, topography, intent, planning, outcome expectations, antecedents, result, medical treatment, and contextual and behavioural factors. It was developed on women with borderline personality disorder (BPD), psychiatric inpatients, and emergency room patients, and has good psychometric properties (Linehan et al., 2006). Unfortunately the SASII does not assess for the likelihood of future acts of NSSI, which limits its clinical utility.

While comprehensive information can be gleaned from the SITBI and the SASII, it is evident that administration can be time-consuming and it may not always be economical or practical to conduct interviews with individuals – particularly in research settings. In addition to this, if one is simply interested in NSSI behaviours, it may not be necessary to use these structured interviews that also assess for thoughts and acts relating to suicide. With the strengths and limitations of these assessment tools in mind, we now focus on self-report questionnaires to measure NSSI.

### 2.2.2 Self-Report Scales

Self-report measures can be divided into two broad categories – those that are designed to simply assess NSSI behaviours, and those that are more comprehensive in their assessment. Two measures are currently available in relation to behaviours: the Deliberate Self-Harm Inventory (DSHI; Gratz, 2001) and the Self-Harm Inventory (SHI; Sansone, Wiederman, & Sansone, 1998). The SHI is a self-report measure containing 22 dichotomous (yes/no) items. It provides scores for history, frequency,
and method, and has been developed for clinical and non-clinical settings. The significant disadvantage of the SHI is that, while it is designed to measure intentionally self-destructive behaviours, it does not adequately distinguish between behaviours with suicidal intent and NSSI. An appropriate alternative to address this concern, however, is Gratz’s (2001) DSHI. The DSHI is based on Gratz’s definition of NSSI as the “deliberate, direct destruction or alteration of body tissue without conscious suicidal intent” (p. 253), and is designed to exclusively capture NSSI. It assesses for 16 specific NSSI behaviours, and provides information regarding history, age of onset, frequency, and severity. Gratz (2001) developed the tool with college students, and has reported good psychometric properties. The scale has been translated for use with Swedish (Lundh, Karim, & Quilisch, 2007) and German (Fliege et al., 2006) individuals.

In addition to the behavioural measures described above, two questionnaires offer broader assessment of NSSI. The first of these is the Suicidal Behaviors Questionnaire (SBQ; Linehan, 1981). This is a 90-item self-report tool that assesses various features of both suicidal and non-suicidal acts of harm to the self. It assesses past behaviours, but also predicts future behaviours, and contains items pertaining to the function of acts. The SBQ has shown to be valid and reliable for use in hospital settings (Linehan, Camper, Chiles, Strosahl, & Shearin, 1987; Linehan, Chiles, Egan, Devine, & Laffaw, 1986). A second comprehensive questionnaire is the Self-Harm Behavior Questionnaire (SHBQ; Gutierrez, Osman, Barrois, & Kopper, 2001). The SHBQ is a 32-item scale that measures NSSI, as well as risk-taking behaviours, suicidal behaviours, ideation and attempts. Within the NSSI component of this measure, the SHBQ provides administrators with assessment of age-of-onset, method,
frequency, most recent occurrence, lethality, and medical outcome. The authors have
demonstrated that the SHBQ has good psychometric properties.

Of the four questionnaires described above, decisions regarding which to
administer will clearly depend on the purpose and the setting. While the SBQ and the
SHBQ offer comprehensive assessments that may be useful in clinical settings, they
are both very lengthy. This is partially due to the inclusion of items to assess suicidal
thoughts and behaviours, which may be unnecessary if focusing just on NSSI. As the
briefer SHI does not adequately distinguish between suicidal and non-suicidal acts,
the DSHI appears a suitable alternative when interested in measuring past NSSI
behaviours.

2.3 Prevalence of Non-Suicidal Self-Injury

The true incidence of NSSI is difficult to determine as much of the behaviour
that occurs in the community does not come to clinical attention, due to it not being
medically serious and/or the fact that people may not seek professional help (Rodham
& Hawton, 2009). This appears to be particularly the case for young people, who are
likely to seek support from peers and social networks for NSSI but do not tend to
access professional or medical assistance (Michelmore, 2012). In addition to this, it is
argued that a clear epidemiological picture cannot be obtained until both clinicians
and researchers agree on the labelling and definition for NSSI (Rodham & Hawton,
2009). Authors such as Meuhlenkamp, Claes, Havertape, and Plener (2012) report that
prevalence statistics can differ substantially based on the measurement tools
researchers use, as well as other methodological factors. At the most basic level,
however, nationally-representative epidemiological studies of NSSI with robust
methodology have generally not yet been performed. With these limitations in mind,
international and Australian-based studies that have aimed to assess the prevalence of NSSI will now be reviewed.

2.3.1 International Prevalence Figures

In a critical review of the international NSSI literature, Jacobson and Gould (2007) reported that approximately 13 to 23% of adolescents and 1 to 4% of adults engage in NSSI at some point in their lives. Their review highlights that relatively few studies have reported on the incidence of NSSI in the international community, with many studies from Europe and the United Kingdom failing to distinguish between NSSI and suicide attempts (i.e. Hawton, Fagg, Simkin, Bale, & Bond, 1997; Hurry & Storey, 1998).

Although relatively out-dated now, a study by Briere and Gil (1998) reported on the estimated prevalence of NSSI in the general adult population in the U.S. Utilizing a sample of 927 individuals, these authors reported a six-month prevalence rate of 4%. Using a sample of 1,986 U.S. military recruits, Klonsky, Oltmanns, and Turkheimer (2003) reported a similar incidence rate of 4% for self-injury. These researchers did not, however, adequately measure whether behaviours were accompanied by suicidal ideation or intent, and the use of a specific subpopulation limits the broader generalisability. Higher estimates were reported in a U.S. college-based survey study by Whitlock, Eckenrode and Silverman (2006), who found a 12-month prevalence rate of 7.3%, and a lifetime prevalence rate of 17%. As highlighted by previous reviewers (i.e. Jacobson & Gould, 2007), however, the participation rate for this particular study was very low, indicating the potential for these figures to be inflated due to a sampling bias. More recently, Klonsky (2011) conducted a study
utilizing 439 adults from the general population across the U.S., reporting a lifetime prevalence rate of 5.9% for NSSI.

Studies on adolescent populations indicate a lifetime prevalence of NSSI ranging between 13% and 23.2% (Laye-Gindhu & Schonert-Reichl, 2005; Meuhlenkamp, Claes, Havertape, & Plener, 2012; Muehlenkamp & Gutierrez, 2004; Muehlenkamp & Gutierrez, 2007; Ross & Heath, 2002; Zoroglu et al., 2003), with a 12-month prevalence ranging from 2.5% to 12.5% (Garrison et al., 1993; Muehlenkamp & Gutierrez, 2007). These studies include samples drawn from secondary schools in Canada and the United States (Garison et al., 2003; Laye-Gindhu & Schonert-Reichl, 2005; Muehlenkamp & Gutierrez, 2004; Muehlenkamp & Gutierrez, 2007; Ross & Heath, 2002) and Turkey (Zoroglu, et al., 2003). A concern highlighted by previous authors (Jacobson & Gould, 2007) is that most of these studies (Muehlenkamp & Gutierrez, 2004; Muehlenkamp & Gutierrez, 2007; Ross & Heath, 2002) do not report participation rates, meaning that the representativeness of their samples is unclear. Nevertheless, general trends in findings indicate that the prevalence of NSSI appears to be higher in adolescents relative to adults, with prevalence increasing over time in secondary school students (Jacobson & Gould, 2007). The latter suggestion that NSSI may be increasing in adolescents needs to be viewed with caution, however, as other authors report that the rise in incidence rates may be accounted for by differences in the way researchers assess the behaviour, as well as other methodological factors (Meuhlenkamp, Claes, Havertape, & Plener, 2012; Swannell, Martin, Page, Hasking, & St John, 2014).

In accordance with NSSI’s association with psychopathology, prevalence rates in clinical populations have typically been found to be higher, with up to 20% of adults and 40% of adolescents demonstrating NSSI (Meuhlenkamp, 2005). Briere and
Gil (1998) examined the prevalence of NSSI in clinical populations in the USA. Of the 390 adult psychiatric inpatients included in their sample, 21% had engaged in NSSI within the previous six months.

At this stage, there is an insufficient amount of reliable international data to confirm whether significant gender differences exist in NSSI behaviour. Whilst some studies report that NSSI is more common in females than males (Laye-Gindhu & Schonert-Reichl, 2005; Meuhlenkamp & Gutierrez, 2007; Ross & Heath, 2002; Whitlock, Eckenrode & Silverman, 2006), others fail to find any such gender difference (Briere & Gil, 1998; Garrison et al., 1993; Muehlenkamp & Gutierrez, 2004; Zoroglu et al., 2003), with recent authors positing that NSSI may be more common in males than previously believed (Rodham & Hawton, 2009). There is, however, some evidence to suggest that men and women differ in terms of age of onset of NSSI, method of NSSI, and degree of medical injury associated with NSSI (Andover, Primack, Gibb, & Pepper, 2010). As new research emerges, the role of gender in NSSI behaviours will hopefully become clearer. Again, however, it is likely that these figures are somewhat dependent on the definition of NSSI that one adopts and the types of behaviours that this definition encompasses.

### 2.3.2 Australian Prevalence Figures

In Australia, prevalence figures for behaviours that encompass suicidal and non-suicidal intent have been published by several independent sources (De Leo & Heller, 2004; Madge et al., 2008; Moran et al., 2011), including the Australian Institute of Health and Welfare (AIHW; Pointer, 2013). With the exception of AIHW statistics, many of these studies have been conducted with samples of secondary school students. In a large study across 14 high schools in Queensland, Australia, De
Leo and Heller (2004) reported a 12-month prevalence rate of approximately 6% for young Australians aged 15-24 years. Madge and her colleagues (2008) conducted a study of DSH (including acts performed with and without suicidal intent) in 15- and 16-year-old school students across seven countries, including Australia. These researchers report a 12-month prevalence rate of 1.7% in Australian males and 11.7% in Australian females, and a lifetime prevalence rate of 3.1% in Australian males and 17% in Australian females. These rates appear higher than other studies. According to Madge et al., the incidence of self-injurious behaviour is higher in Australia compared to other countries, with the Netherlands having the lowest rates overall. In a longitudinal study of 1,943 individuals from 44 secondary schools across Victoria, Moran and his colleagues (2011) found a more modest 12-month prevalence rate for adolescents (mean age = 15.9) of 3.6% for males and 6.5% for females, revealing a reduction in self-injury as participants progressed to late adolescence and early adulthood. They also reported a slightly less pronounced gender difference than Madge et al., with 10% of females and 6% of males reporting self-injury.

The AIHW have compiled statistics on the number of hospital admissions resulting from self-injurious behaviours, which encompass acts with and without suicidal intent. In Australia in 2010 and 2011 there were 26,062 recorded cases of hospitalisations for self-injury, a figure which has gradually increased over time since 1999-2000. This finding may suggest that self-injurious behaviour may be on the rise in Australia, may reflect an increase in help-seeking, and/or may indicate that individuals are employing more dangerous and lethal means of self-injury that require medical attention and hospitalization. Their data also indicates that self-injury is most prevalent in young adults (aged 25-44). Amongst young adults, men appear to present
more frequently for self-injury overall, however, these presentations are more common in females than males in the more specific age-bracket of 15-24 years.

There are very few Australian community-based prevalence studies that have separated non-suicidal acts from behaviours with suicidal intent, and it is argued that this is an area requiring further research, particularly given the aforementioned notion that the majority of NSSI does not come to the attention of medical services. Patton and his colleagues (1997) assessed the prevalence rate of NSSI in a representative sample of students from 45 Victorian secondary schools, reporting a 12-month prevalence estimate of 5.1% for students aged 15- to 16- years. However, while they controlled for suicidal intent, their definition of NSSI also incorporated indirect acts such as recklessness, risk-taking and illicit drug use. Additionally, prevalence results from this study are of limited utility in that they apply only to 15- and 16-year-olds and not younger and older adolescents and adults. Martin, Swanell, Hazel, Harrison and Taylor (2010) completed a cross-sectional study using data from phone-based interviews of 12,006 Australians from randomly selected households. They reported that 1.1% of respondents reported that they engaged in NSSI over the previous four weeks, finding a six-month prevalence rate of 1.8% and a lifetime prevalence of 8.1%. While gender differences were not statistically significant across all groupings, females were more likely than males to report that they had engaged in NSSI at some point in their lives. Consistent with previous studies, NSSI was more common in adolescence, but interestingly NSSI peaked at a younger age for males when compared to females. It must be noted that the response rate for this study was very low (38.5%), suggesting that these figures may be limited by sampling bias and may not be entirely representative of the general population. More recently, in a systematic review of the literature and meta-analysis, Australian researchers have reported
pooled NSSI prevalence figures of 17.2% among adolescents, 13.4% among young adults, and 5.5% among adults (Swannell, Martin, Page, Hasking, & St John, 2014).

2.3.3 Comorbidity and Associated Psychopathology

As demonstrated by the prevalence figures outlined above, NSSI is more common amongst individuals in clinical populations (Briere & Gil, 1998; Meuhlenkamp, 2005). Nock (2009) suggests that this is likely to reflect the fact that NSSI may share etiological pathways or vulnerability factors with a variety of psychiatric disorders. Although NSSI was once considered to be restricted to individuals with BPD, today it is recognised as a common phenomenon in young people and adults from a range of settings, and with a variety of diagnostic profiles (Prinstein, Guerry, Browne, & Rancourt, 2009). Indeed, NSSI is not simply a symptom of one psychological condition or cluster of conditions; individuals with NSSI appear to be a diagnostically diverse cohort. This assertion provides a basis for arguments that self-injury needs to be considered as a phenomenon in and of itself, rather than simply a symptom of BPD.

Psychopathology commonly associated with NSSI in adolescents includes internalising disorders (such as major depressive disorder, post-traumatic stress disorder, and generalised anxiety disorder), externalising disorders (such as conduct disorder and oppositional defiant disorder), and substance use disorders (especially nicotine, marijuana and alcohol abuse and dependence) (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). NSSI is also commonly comorbid with eating disorder diagnoses, and it has been suggested that the two are somewhat etiologically related (Claes & Vandereycken, 2007a; Claes, Vandereycken, & Vertommen, 2001; Cross, 1993; Farber, 2008). Personality disorder diagnoses are also prevalent amongst
those who engage in NSSI, with BPD being the most common of these (Nock et al., 2006), as reflected by the fact that NSSI remains a symptom of this syndrome (American Psychiatric Association, 2013).

It is necessary to mention that while NSSI is seen as a distinct behavioural phenomenon from suicide attempts in terms of its functions and correlates, the two acts often co-occur within individuals (Brown, Comtois, & Linehan, 2002). Employing a sample of adolescents selected from a psychiatric inpatient unit, Nock et al. (2006) reported that 70% of the cohort engaging in recent NSSI reported a lifetime history of at least one suicide attempt, with 55% reporting two or more suicide attempts during their lifetime. It appears that the greater the number of NSSI methods an adolescent employs, and the longer they have been engaging in NSSI, the higher the likelihood that they will have attempted suicide at some stage. From a clinical perspective, the co-occurrence of NSSI and suicide highlights the importance of early intervention.

2.3.4 Common Methods

Whilst it has been established that NSSI does not include acts that cause indirect harm to the self (e.g. reckless driving or drug abuse) or acts that are socially acceptable (e.g. body-piercing or tattooing), numerous types of NSSI behaviours are exhibited, and vary greatly in their severity from behaviours that are harmful, yet relatively minor in lethality, to acts that are highly dangerous and potentially lethal (Briere & Gil, 1998). Gratz (2001) provides a list of 16 behaviours contained within the Deliberate Self-Harm Inventory (DSHI). According to this, the following behaviours can be considered acts of NSSI: Cutting part of the body (such as wrists, arms, or thighs), burning oneself with a lighter or match, carving words into the skin,
carving pictures into the skin, severely scratching the skin, biting oneself, rubbing sandpaper on skin, dripping acid on skin, using bleach or oven cleaner on skin, sticking sharp objects (pins, needs, staples) into the skin, rubbing glass into the skin, breaking bones, banging one’s head against something, punching oneself, and interfering with the healing of a wound. It can be seen that Gratz does not include acts that involve internal damage to the self, such as swallowing or ingesting an object or substance, although the Dshi includes an “other” item where this may be recorded.

The AIHW have reported that self-poisoning was the most common form of self-harm between 2010 and 2011, accounting for 82% of hospitalised cases (Pointer, 2013). However, as the AIHW include suicide attempts within their definition of self-injury, this is not considered an accurate representation of NSSI. Other Australian studies report that cutting or self-laceration is the most commonly reported method of self-injury (De Leo and Heller, 2004; Patton et al., 1997). In a review of the intentional self-harm literature, Jacobson and Gould (2007) found that self-hitting and using a sharp object to cut oneself were consistently shown to be the most commonly used methods of self-injury by adolescents. Other methods frequently endorsed included interfering with the healing of a wound, self-burning, pinching, and scratching one’s self. Also apparent is the fact that multiple methods may be employed, which is related to more serious psychopathology and/or heightened risk (Kumar, Pepe, & Steer, 2004; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein 2006; Zlotnick, Donaldson, Spirito et al., 1997).

2.4 Etiological Understandings of Non-Suicidal Self-Injury

Favazza (2009) encourages clinicians to understand NSSI as “a morbid form of self-help” (p.34), due to the fact that it is often used to provide an individual with
temporary relief or respite from a wide variety of psychopathological symptoms. Favazza also reasons that NSSI may symbolise an individual’s desperate efforts to experience social stability, healing, or some degree of spirituality. This relates to the aforementioned notion that NSSI may be about life rather than death. Nevertheless NSSI may be engaged in for multiple reasons, and may serve several concurrent or separate functions for individuals (Nock & Cha, 2009). The growing rates of NSSI have lead to an increase in the amount of research aimed at identifying factors that may explain this complex behaviour (Prinstein, Guerry, Browne, & Rancourt, 2009). In many cases this has lead to descriptive data across certain variables, differentiating those who self-injure from those who do not. In recent years, more comprehensive explanatory models have also been developed. These larger models or theories can be described as transactional, in that they seek to explain the functions of NSSI with reference to known risk factors or deficits that appear to predict the onset of the behaviour.

It is beyond the scope of the current research to examine all variables associated with NSSI in detail. As discussed within the overview provided in Chapter 1, this review aims to specifically focus on factors relating to attachment, emotion regulation and coping as select variables that may be important in providing a framework with which to understand the development and maintenance of NSSI. For this reason, Chapters 3 and 4 are dedicated to discussion and critique of theory and research related to these constructs of interest. Having said this, it is important to also provide an overview of other related etiological models of NSSI, which is what follows in this subsection of the current chapter.

For the purposes of the current research, aetiological accounts of NSSI are summarised briefly, as a summary and extension of reviews by authors such as Nock
To begin with, the risk factors and correlates of NSSI are explained below. Following on from this, an overview of the main biological, psychological, and interpersonal models used to explain the development and maintenance of NSSI is provided. Psychological models are primarily concerned with the behavioural functions of NSSI, as well as the psychological dysfunctions and deficits an individual engaging in NSSI is likely to present with. Interpersonal models seek to explain how relationship factors may contribute to the development and maintenance of NSSI. Biological explanations include theories relating to genetics, endogenous opioids, serotonin, and the hypothalamic-pituitary-adrenal (HPA) axis. As the current research places greater emphasis on the role of psychosocial correlates of NSSI, there is less focus here on biological models. Nevertheless, as the importance of neurobiology in understanding psychopathology is recognised, related research is very briefly outlined.

### 2.4.1 Risk Factors

The term risk factor can be defined as a measurable factor or variable that precedes an outcome of interest, and is associated with heightened risk of developing that outcome (Kraemer et al., 1997). As knowledge regarding risk factors of NSSI may provide a basis for intervention at both the individual and wider community levels, psychological research has focused on understanding variables that correlate with NSSI.

Fliege, Lee, Grimm and Klapp (2009) have conducted a systematic review of risk factors for NSSI, including a total of 59 papers from the extant literature. They report that it is well established that traumatic and/or stressful childhood events (including parental separation, mental illness in a parent, prolonged separation from a
parent, abuse, and neglect) appear to place individuals at higher risk of NSSI later in life. This assertion has lead theorists to suggest that early childhood problems (abuse or neglect) may lead to NSSI disturbances as a result of various mechanisms, such as maladaptive attachment and a poor capacity for supportive interpersonal experiences (Prinstein, Guerry, Browne, & Rancourt, 2009). Theorists also suggest that negative self-beliefs or cognitions that can develop following trauma can place individuals at increased risk for NSSI (Castille, et al., 2007). This research points to the importance of childhood attachment relationships, an area of research and theory that is discussed comprehensively in Chapter 3. Other authors discuss the importance of factors such as parental support, parental criticism, and perceived emotional support, finding that these variables relate to NSSI behaviours (Baetens et al., 2014a; Baetens et al., 2014b).

Regarding proximal risk factors (those that tend to more closely precipitate the onset of NSSI), general psychopathology (including depression, anxiety, and anger) appears to be important in understanding NSSI. Authors have reported that NSSI may be precipitated by higher levels of perceived stress (Fliege et al., 2006) and critical life events (Portzky, De Wilde, & Van Heeringen, 2007), with the understanding that individuals appear to have lower self-efficacy (Fliege et al., 2004), lower levels of optimism (Tanner, Hasking, & Martin, 2013) and a higher tendency to self-blame or self-derogate when trying to cope (De Leo & Heller, 2004; Herpertz, Sass, & Favazza, 1997; Klonsky, Oltmanns, & Turkheimer, 2003). Further, those with a tendency to engage in NSSI report experiencing greater negative affect than those who do not (Fliege et al., 2009). This relates to the function of emotion regulation, which is examined in Chapter 4.
In addition to this, there is some limited empirical evidence that indicates that a propensity for derealisation or dissociation may be an individual risk factor for NSSI (Low, Jones, MacLeod, Power, & Duggan, 2000), with the suggestion that this may mediate the relationship between childhood trauma and NSSI (Briere & Gil, 1998; Pao, 1969). There has also been some research attention directed toward the relationship between trait impulsivity and NSSI, but support for this as a risk factor appears to be mixed (Evans, Platts, & Liebenau, 1996; Gratz, 2003; Herpertz et al., 1997; Simeon et al., 1992). Finally, there is some evidence to suggest that social learning or modeling may contribute to the development of NSSI, with research demonstrating that adolescents may learn self-injurious behaviour from peers and media sources (Deliberto & Nock, 2008). That is, observational learning may play a role in NSSI when an individual perceives the behaviour as favourable, and when he or she can identify with its purpose (Nock, 2009; Nock & Cha, 2009). Recent research shows that having a friend who self-injures may be a risk factor for NSSI among young people experiencing high levels of distress (Hasking, Andrews, & Martin, 2013).

The main concern with this area of NSSI research relates to the fact that previous studies have been heavily reliant on retrospective reports that may be prone to various forms of recall bias. For instance, given the aforementioned correlation between NSSI and mood disorder symptomatology, reports of experiences prior to the onset of NSSI may be characterised by a mood-congruent memory bias (Watkins, Martin, & Stern, 2000). It is also well established that there is substantial measurement error involved in retrospective reports of distal adverse childhood experiences (Hardt & Rutter, 2004). Therefore, whilst cross-sectional findings
contribute to our understanding, studies employing longitudinal methodology are needed to further clarify the risk factors for NSSI.

2.4.2 Neurobiological Correlates

There is a growing body of research to suggest that neurobiology may play a role in the development and maintenance of NSSI. To begin with, there appears to be some evidence that genetic factors may contribute to NSSI and associated characteristics (Evans et al., 2000; Joyce et al., 2006; Pooley, Houston, Hawton, & Harrison, 2003), however, research in this area is still at a preliminary stage (Groschwitz & Plener, 2012; Sher & Stanley, 2009). Studies utilizing neuroimaging have found that BPD may be associated with abnormalities in brain morphology and neuronal activity, such as decreased anterior cingulate cortex volume (Whittle et al., 2009), increased pituitary gland volume (Jovev et al., 2008), decreased activity in the orbitofrontal cortex (Brunner et al., 2010), and higher activation in the amygdala (Niedtfeld et al., 2010). These findings are limited, however, in that they relate to BPD rather than NSSI specifically. It has also been suggested that NSSI is associated with changes in physiological reactivity, with findings that individuals who engage in NSSI report a reduction in physiological arousal when imagining NSSI (Brain, Haines, & Williams, 1998; Haines, Williams, Brain, & Wilson, 1995). A reduction in physiological arousal may be an outcome sought by individuals who engage in NSSI.

Empirical research suggests that NSSI may be partially explained by the function of neurotransmitters. There is some inconsistent evidence for a serotonin deficiency in those with NSSI behaviours (Herpetz, Sass, & Favazzam 1997; New et al., 1997; Simeon et al., 1992), and decreased serotonin is said to lead to an increase in impulsivity and aggressive behaviour towards oneself and others (Steinnm
Hollander, & Liebowitz, 1993). In addition to this, there is limited evidence for increased dopamine levels in those vulnerable to NSSI (Osuch & Payne, 2009; Tiefenbacher, Novak, Lutz, & Meyer, 2005), however studies are inconsistent and not specific to NSSI in humans. Although there is limited NSSI-specific research available, the HPA axis may also be implicated, with the notion that adverse childhood experiences may lead to a hyporesponsive HPA axis, which is involved in regulating responses to stress, mood and emotions (Kaess et al., 2012; Kanter et al., 2001; Yehunda, Halligan, Golier, Grossman, & Bierer, 2004).

Finally, scientific research also suggests that endogenous opioids may be implicated in the expression of NSSI (Schmahl, McGlashan, & Bremner, 2002; Tiefenbacher et al., 2005). It has been found that opioid deficiencies may explain lower pain sensitivity during NSSI (Kemperman, Russ, & Shearin, 1997; Russ, Campbell, Kakuma, Harrison, & Zanine, 1999), and that self-injury may lead to the release of opioids in certain individuals (Tiefenbacher et al., 2003). It can be reasoned that this could explain the “addictive” quality of NSSI behaviours (Groschwitz & Plener, 2012). Sher and Stanley (2009) propose a “homeostasis model of self-injury” (p. 107). They reason that severe and chronic childhood trauma and stress (i.e. abuse and neglect) may lead to endogenous opioid deficiency or habituation to higher levels of opioids. They state that NSSI may reflect an attempt to restore opioid levels, or else increase them to a higher level to cope with stress. Sher and Stanley emphasise the potential for early traumatic events to lead to a form of stress-induced analgesia, which may play a role in the pain insensitivity in those who engage in NSSI.

As highlighted by previous reviewers (Groschwitz & Plener, 2012; Sher & Stanley, 2009), research into the neurobiological correlates of NSSI is still in its infancy, and further studies are required to better understand the roles of genes,
neurotransmitters, physiological reactivity, and differences in brain activation. Overall, however, early findings appear to point to an interaction between environmental and biological factors in the development and maintenance of NSSI.

2.4.3 Psychological and Interpersonal Models

A number of psychological and interpersonal models have been put forward to explain the function of NSSI. Many of these relate to the risk factors covered in section 2.4.1. Most commonly cited are the functional model and the experiential avoidance model, and these theories have the most empirical support. Other models include the anti-dissociation model, the self-punishment model, the pragmatic hypothesis, the anti-suicide model, and the role of sensation-seeking, interpersonal stress, and interpersonal influence. Broadly speaking, the little research that supports the latter models is now somewhat dated, and so they are considered less relevant today. The models are briefly outlined below.

2.4.3.1 Functional model.

A functional approach to understanding self-injury is concerned with the processes that produce and maintain the behaviour (the antecedents and consequences) (Nock & Cha, 2009). An example of this approach is Nock and Prinstein’s (2004) four-function model (FFM) of NSSI. Consistent with a learning theory approach to understanding human behaviour, Nock and Prinstein’s FFM posits that NSSI is employed as a result of four functions which occur along two orthogonal dimensions: reinforcement, which may be either positive or negative, and contingencies that can either be social (interpersonal) or automatic (intrapersonal). In automatic-negative reinforcement, NSSI is used as a means of reducing negative affective states, while in automatic-positive reinforcement, NSSI allows one to
generate more positive feelings and achieve a desirable physiological state. Conversely, social-negative reinforcement involves NSSI being used to escape from interpersonal demands, and social-positive reinforcement refers to when NSSI is employed to gain access to materials, or attention from others. The intrapersonal dimension of the FFM relates to emotion regulation concepts that are discussed further in Chapter 4. The interpersonal dimension also overlaps somewhat with concepts relating to attachment theory, which is discussed in Chapter 3.

Nock and Prinstein (2004, 2005) have demonstrated preliminary support for the FFM in a clinical sample of adolescents with a recent history of NSSI. The authors found that participants most frequently endorsed items associated with the automatic-negative reinforcement function of NSSI. They reported that NSSI appeared to be most often employed as a method of regulating internal states, with the interpersonal dimensions of the FFM endorsed less frequently than the intrapersonal dimensions. Overall, Nock and Prinstein found that the FFM had a good fit to the data, and appeared structurally reliable and valid. While these results are cross-sectional and limited by their reliance on retrospective reports regarding the functions of NSSI, Nock and Prinstein (2009) have recently found further support for the four proposed functions of NSSI through a study employing moment-to-moment assessment and electronic journaling. The findings were consistent with those from their previous cross-sectional study, with the authors reporting that participants identified that the most frequent purpose of NSSI was to decrease negative affect, and that it was less common for respondents to endorse interpersonal functions of NSSI.

The intrapersonal factors discussed in the FFM overlap with some of the processes suggested by Chapman, Gratz and Brown’s (2006) model of experiential avoidance, which will now be discussed. In fact, it should be noted that the FFM, in
many ways, acts to unify existing frameworks that have limited or dated empirical support, as described below.

2.4.3.2 Experiential avoidance model.

One of the most widely researched explanations as to why an individual may engage in NSSI relates to the behaviour being employed as a strategy to regulate emotional distress (Brown, Comtois & Linehan, 2002; Chapman, Gratz, & Brown, 2006; Nock & Prinstein, 2004). This affect-regulation theory posits that an individual may be motivated to engage in NSSI as a means of reducing negative affect or tension. Chapman, Gratz and Brown (2006) have proposed an experiential avoidance model (EAM) of NSSI. Experiential avoidance has been broadly defined as behavioural attempts to avoid or escape from unwanted thoughts, emotions, and physical sensations (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). A number of behaviours are said to come under the category of experiential avoidance, including acts such as alcohol and drug use, thought suppression, distraction, and avoidance coping (Chapman et al., 2006). The EAM reasons that NSSI is a negatively reinforced behaviour that functions to decrease or eliminate unwanted emotional states.

Chapman and his colleagues state that although NSSI provides short-term or temporary relief from distress, the benefits are not maintained in the longer-term. The EAM is consistent with the automatic-negative reinforcement aspect of the FFM put forward by Nock and Prinstein (2004). Both Chapman et al. and Nock and Prinstein contend that individuals will be vulnerable to NSSI if they experience high levels of emotional distress that they are unable to manage.

As outlined more comprehensively in Chapter 4, wherein concepts of emotion regulation and coping are discussed, preliminary support for the EAM has been found in studies that have demonstrated that individuals with a tendency to engage in NSSI,
relative to those who do not, report that they more frequently attempt to avoid problems or stressors in order to cope (i.e. Williams & Hasking, 2010). The greatest support for the EAM, however, has been found in studies using innovative diarying techniques to demonstrate that negative mood increases before NSSI, and decreases following NSSI behaviours (Armey, Crowther, & Miller, 2009; Meuhlenkamp et al., 2009).

2.4.3.3 Anti-dissociation model.

The anti-dissociation model reasons that self-injury functions as a response to periods of dissociation or depersonalization that occur as a result of intense emotions that individuals have difficulty regulating. NSSI appears to interrupt dissociative episodes common to clinical syndromes such as BPD, and allows an individual to regain a clearer and more coherent sense of self (Gunderson, 1984). Individuals who have a tendency to dissociate may describe feeling numb or void of sensations and emotions. NSSI may, theoretically, be a way to generate sensations that allow one to feel real again (Klonsky, 2007).

There is mixed empirical support for the anti-dissociation model. Brown, Comtois, and Linehan (2002) found that women with BPD often reported that they engaged in NSSI to stop dissociative symptoms and generate feelings. Similar results have been reported by other authors in studies of both community and acute psychiatric inpatient samples (Favazza & Conterio, 1989; Penn et al., 2003). Many other studies, however, have reported very little support for the anti-dissociation hypotheses, finding that only a very small percentage of respondents endorsed this function (Herpetz, 1995; Shearer, 1994). Wilkins and Coid (1991) reported that approximately one quarter of women prisoners indicated experiences of dissociation (derealisation and depersonalization specifically) prior to NSSI. Other authors have
found that individuals tend to dissociate during, rather than before, NSSI episodes (Kemperman, Russ, & Shearin, 1997), which is contradictory to the proposed functional implications and casual pathways of NSSI purported by the anti-dissociation model.

As is the case with the vast majority of the theories outlined in this section, empirical research examining the anti-dissociation hypothesis is limited by the reliance on cross-sectional data and retrospective self-report measures. As highlighted by previous reviewers (i.e. Klonsky, 2007), although respondents may be able to provide valuable insight into the function of NSSI for themselves, reports may be biased due to the fact that individuals may lack insight into their motivations, may have difficulty expressing or verbalizing functions of NSSI, or may be somewhat embarrassed in hindsight. It is also important to note, that the anti-dissociation model can be understood within the context of models with greater empirical support, such as Nock and Prinstein’s (2004) FFM, which reasons that NSSI may act to terminate unpleasant experiences such as dissociation.

2.4.3.4 Self-punishment model.

The self-punishment hypothesis argues that NSSI may function as a form of self-directed abuse resulting from higher than normal tendencies to be self-critical, which may have been learnt during early childhood experiences (Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Klonsky, 2007; Nock, 2009; Nock & Prinstein, 2004). Studies suggest that self-criticism may mediate the relationship between childhood maltreatment and NSSI (Glassman et al., 2007), whereby individuals learn to be overly critical of themselves or develop harmful and negative views of the self that lead to them feeling the need to physically punish themselves. Researchers have demonstrated preliminary support for this notion with the finding that those who
engage in NSSI have a stronger tendency to self-derogate and report higher levels of
self-directed anger (Herpertz, Sass, & Favazza, 1997; Klonsky, Oltmanns, &
Turkheimer, 2003). Further studies have demonstrated that individuals endorse self-
punishment as a motivation for NSSI (Brown, Comtois, & Linehan, 2002; Laye-
Gindhu, & Schonert-Reichl, 2005; Shearer, 1994). Many other studies, however, have
reported that self-punishment is infrequently identified as a causal factor of NSSI
(Herpertz, 1995; Kumar, Pepe, & Steer, 2004; Osuch, Noll, & Putnam, 1999), and
authors have suggested that it may be secondary to the affect regulation function
(Klonsky, 2007). Studies in this area are limited due to the methodological constraints
of self-report measures and cross-sectional data highlighted above.

2.4.3.5 Pragmatic hypothesis.

One of the most parsimonious explanations for why people choose to engage
in NSSI is the pragmatic hypothesis, which reasons that NSSI is a relatively fast and
simple method with which one can achieve a number of functions (Nock, 2009). In
the case of an individual who lacks the executive control with which to regulate
emotions, NSSI may be an attractive coping strategy that can be performed quickly, in
almost any setting, and without necessarily requiring specific materials or provisions
(Nock, 2009). There is some evidence that individuals who engage in NSSI believe
that they have limited access to strategies with which to cope with distress (Gratz &
Roemer, 2007; Heath, Toste, Nedecheva, & Charlebois, 2008), and affect-regulation
theories support the notion that NSSI may be conceptualised as a coping strategy
(Brown, Comtois & Linehan, 2002; Chapman, Gratz, & Brown, 2006; Nock &
Prinstein, 2004). Beyond this, however, the pragmatic hypothesis has not been
empirically tested.
2.4.3.6 Anti-suicide model.

The anti-suicide model is based on psychoanalytic principles, and reasons that NSSI can function to allow an individual to resist the urge to attempt suicide, serving as replacement behaviour that does not involve risking one’s life (Himber, 1994). This is consistent with Menninger’s (1938) view of NSSI as a method of survival through avoiding suicide by substituting mutilation of one specific body part. Three studies have reported modest support for the anti-suicide model, finding that some individuals have identified engaging in NSSI to prevent suicide ideation and/or attempts (Laye-Gindhu & Schonert-Reichl, 2005; Nixon, Cloutier, & Aggarwal, 2002; Shearer, 1994). These studies are limited by their use of retrospective self-report measures that are vulnerable to biases similar to those discussed above. Overall there is little empirical support for this hypothesis.

2.4.3.7 Sensation seeking model.

Another psychological model posited to explain NSSI relates to the notion that it may allow an individual to experience excitement or feelings of exhilaration in a similar vain to risk-taking activities (Nixon, Cloutier, & Aggarwal, 2002; Osuch, Noll, & Putnam, 1999; Shearer, 1994). As asserted by Klonsky (2007), this particular model has received less attention than other explanations of NSSI, likely as a result of the fact that it is not consistent with the experience of clinicians or those who engage in NSSI. There is some support for the notion of sensation seeking in self-report studies (Laye-Gindhu & Schonert-Reichl, 2005; Osuch et al., 1999; Shearer, 1994), however, it appears to be a very infrequently endorsed motivation for NSSI, and may be secondary to other functions.
2.4.3.8 Interpersonal stress.

Researchers have demonstrated that interpersonal stressors (such as loneliness, rejection, loss, or conflict) often immediately precede NSSI behaviours (Hawton & Harriss, 2006). Such findings have led to social information processing theories which state that NSSI is a result of a person’s diminished capacity to generate adaptive behavioural strategies to deal with stressors (Prinstein, Guerry, Browne, & Rancourt, 2009). It is thought that individuals with a vulnerability to NSSI may become hyper-aroused in a stressful situation and therefore may be less able to access social-problem solving skills (Prinstein, Guerry, Brown, & Rancourt, 2009). Facets of this theory have been supported by a number of empirical research studies (Howat & Davidson, 2002; Kehrer & Linehan, 1996; Nock & Mendes, 2008), but overall there is limited empirical support. The interpersonal stress hypothesis has some overlap with theories relating to the impact of attachment on NSSI, which is discussed in Chapter 3.

2.4.3.9 Interpersonal influence.

Finally, a social signalling hypothesis has been proposed, whereby individuals may employ NSSI as a means of communication in the case where less intense strategies have been unsuccessful, or as a result of an invalidating or unresponsive environment (Nock, 2008; Wedig & Nock, 2007). As with interpersonal stress, explanations relating to interpersonal influence can also be explained in reference to attachment theory. Self-injury is conceptualized as a means of influencing the behaviour of others, avoiding abandonment, gaining attention or help, or an attempt to be taken more seriously (Allen, 1995). The premise behind this explanation is that high-cost or high-intensity behaviours (like NSSI) are more likely than low-intensity behaviours (such as verbal requests) to elicit a response from others (Nock, 2009). A number of authors have reported that individuals who engage in NSSI identify that
they do this for reasons such as to gain support, to influence change in others’
behaviours or reactions, or as a cry for help or attention (Briere & Gil, 1998; Brown,
Comtois, & Linehan, 2002; Herpertz, 1995; Laye-Gindhu and Schonert-Reichl, 2005;
Nock & Prinstein, 2004; Shearer, 1994). As per previous models, however, these
findings are limited by the fact that they are based on retrospective self-report data.

2.4.3.10 Summary of Etiology Research

As is clear from this brief discussion, many factors and theories have been put
forward in attempts to explain the development and maintenance of NSSI. While the
findings outlined above certainly contribute to clinical understanding of NSSI, this
area of research has a number of limitations. Firstly, findings from empirical studies
exploring the etiology of NSSI to date have been weakened by the fact that they are
largely reliant on cross-sectional designs and retrospective measures – often because
of legal and ethical issues (Prinstein, Guerry, Browne, & Rancourt, 2009). In addition
to this, clinicians and researchers may have difficulty integrating multiple variables
into a coherent theory or practice model. Currently, research has not been effectively
conducted that establishes the relative importance and functional relationships
between all proposed psychological and interpersonal contributors to NSSI, in terms
of both distal and proximal factors. While clinicians are aware that self-injury
presentations are heterogeneous and complex, and burgeoning research over the last
decade has expanded understandings of NSSI, it is hoped that further studies continue
to elucidate the relationship between risk factors and functions, to assist in
intervention and treatment planning.

As reasoned by previous authors (Claes & Vandereycken, 2007b; Favazza,
1989; Suyemoto, 1998) NSSI may serve a variety of functions, which is perhaps why
so many explanatory models have been put forward. This provides a challenge for
researchers and practitioners when determining which model to adopt. Most
concerning, however, is the assertion that while a number of the above models have
face validity, many have not been thoroughly researched and there is limited empirical
evidence to support their claims.

Of all of the risk factors that have been put forward, there appears to be the
most consistent empirical support for the notion that traumatic and stressful childhood
events may place individuals at risk of developing NSSI later in life (Fliege, Lee,
Grimm, & Klapp, 2009), despite some concerns with the methodology of studies in
this area. Although it is important to note that childhood trauma is not necessary in
and of itself for one to develop NSSI, and other variables appear to interact with such
early life experiences (Armey, Crowther, & Nugent, 2012), the reasoning that events
such as abuse and neglect in childhood may lead to ongoing relationship difficulties
and a poor capacity for self-regulation, and resultant NSSI, has good face validity and
is complemented by relatively robust empirical evidence (Prinstein, Guerry, Browne,
& Rancourt, 2009). This suggests that theory relating to attachment may be
particularly important in understanding the development of NSSI.

Regarding the maintenance of NSSI, the FFM and the EAM remain the most
well studied models of NSSI, with empirical findings particularly providing support
for the notion that NSSI may function to reduce high levels of negative affect. In a
review of the empirical literature in this area, Klonsky (2007) concludes that there is
the most evidence for the affect-regulatory function of NSSI, and recent studies have
found additional support using innovative diary techniques that are less prone to bias
(Armey, Crowther, & Miller, 2009; Meuhlenkamp et al., 2009). This suggests that
emotion regulation may be another important construct to examine in seeking to further understand NSSI.

2.5 Chapter Summary

The psychological literature on NSSI has been inhibited by the fact that there has been no agreed upon terminology and classification system for behaviours involving harm to the self. Scholars appear to disagree on whether non-suicidal and suicidal behaviours should remain distinct, and whether indirect forms of harm and/or culturally sanctioned behaviours should be included in definitions. The apparent lack of clarity in this area has concerning implications for both research and practice in the area of NSSI, which could impede advancement in this area of psychology.

Disagreements regarding nomenclature and operational definitions of NSSI have likely impacted upon the measurement of NSSI, and there are only a relatively small number of tools to measure NSSI available, including structured interviews and self-report scales. Partially as a result of these factors, the incidence of NSSI is difficult to determine. While research has suggested a 12-month prevalence rate of approximately 8.1% in Australia, with higher incidence in adolescents, prevalence studies could be replicated and methodology improved upon. Figures from international studies suggest that prevalence may be rising in Western countries. Whilst NSSI is common in non-clinical populations, it is more commonly seen in individuals with mental illness, and has been associated with personality disorder pathology as well as a number of other diagnoses (such as mood disorders, post-traumatic stress disorder, generalised anxiety disorder, substance use disorder, conduct disorder, and eating disorders). Across studies that have used different
measures, the most commonly reported method of NSSI appears to be self-laceration or cutting of the skin on some area of the body.

A number of variables appear to be associated with NSSI, and a plethora of biological, psychological and interpersonal theories have been put forward to explain its development and maintenance. Research in this area is relatively preliminary, however, and further studies are required to examine the relative importance of factors, and to validate theories using longitudinal and/or real-time assessment methodology.

Following on from the above introduction to NSSI, Chapters 3 and 4 focus on critically appraising theory and research relating to attachment, emotion regulation and coping. As discussed in the previous subsection, research examining the impact of stressful events in childhood, and the affect-regulatory function of NSSI point to the notion that these may be important constructs. Both emotion regulation and, more recently, attachment have received attention in the theoretical and empirical literature regarding NSSI, and in combination could contribute significantly to our understanding of the development and maintenance of such maladaptive behaviour patterns.
Chapter 3: Attachment Theory and Non-Suicidal Self-Injury

Between 1940 and 1990 a British psychoanalyst called John Bowlby and his American colleague Mary Ainsworth made an invaluable contribution to the field of psychology by developing attachment theory. Building on the psychoanalytic beliefs of the time, this theory incorporated ideas from cognitive-developmental psychology, post-Darwinian ethology, community psychiatry and cybernetics (Mikulincer & Shaver, 2007). Laying the foundations for a conceptual framework which has now become one of the most widely researched theories of modern psychology, Bowlby and Ainsworth attempted to explain why the development of personality appears to be so profoundly influenced by relationships with parental figures (or caregivers) in early childhood.

The available literature on attachment theory spans over 40 years, and is used today by both clinicians and academics to understand and explain a wide variety of psychological conditions and maladaptive behaviour patterns (Dozier, Stovall-McClough, & Albus, 2008; Obegi & Berant, 2009). The utility of attachment theory research also extends to problematic behaviour such as NSSI (Gormley & McNiel, 2010; Gratz, Conrad, & Roemer, 2002; Hallab & Covic, 2010; Kimbal & Diddams, 2007; Stepp, et al., 2008). This chapter provides a brief introduction to attachment theory, before examining the theoretical and empirical literature that relates it to the development and maintenance of NSSI.

3.1 Overview of Attachment Theory

Mercer (2005) broadly defines attachment as “the emotional ties that exist between human beings and guide their feelings and behaviour” (p.2). In attachment
theory, this specifically refers to the emotional ties that exist between a child and a caregiver. Bowlby (1982) explains the function of this type of emotional tie by considering evolutionary and cognitive perspectives, reasoning that a child’s first human relationship is the cornerstone for his or her personality development.

Bowlby (1973, 1980, 1982) discusses the concept of an *attachment behavioural system* – a biologically evolved and species-universal program that allows individuals to behave in ways that increase chances of reproduction and survival. According to Bowlby’s theory, human infants possess a repertoire of behaviours when they are born (*attachment behaviours*), which are specifically designed to lead to proximity and support from significant others (*attachment figures*) who are necessary as a means of providing protection in times of psychological and physical threat. Attachment figures are also thought to be essential for helping an infant learn to effectively regulate emotions, and to encourage healthy and safe exploration of surroundings (Bowlby, 1973, 1980). Although this attachment system appears most important in infancy (where one is reliant on care and protection from others), Bowlby (1988) postulated that it remains active throughout the lifespan. By examining behavioural systems in detail, Bowlby identified how functional and dysfunctional aspects influence various situations in childhood, adolescence, and adulthood.

According to Bowlby’s theory, the attachment system functions in a cycle. It is activated by signals of threat or potential danger (i.e. fatigue, ill health, pain, cold, hunger, or unfamiliarity), which prompt one to seek comfort and protection from an attachment figure. When this is achieved, feelings of security and stress reduction are experienced, attachment behaviours are terminated, and one is allowed to concentrate on other goals or activities. This cycle provides one with a prototype of a successful
emotion regulation strategy and the ability to regulate interpersonal closeness.

Theoretically, when attachment relationships are healthy, an individual learns to function autonomously, while also effectively relating to others.

Individual variance in attachment-system functioning is said to be primarily the result of the quality of attachment-figure interactions in times of distress (Bowlby, 1973, 1988). Theoretically, if an available, responsive and sensitive caregiver meets proximity seeking efforts, an individual will likely experience a sense of safety – assured in the knowledge that he or she may explore the environment while having a secure-base to return to. Disruption in the attachment system occurs, however, when a primary caregiver is emotionally or physically unavailable or unresponsive in times of need, or if their availability and responsiveness is inconsistent (Mikulincer & Shaver, 2007). Such instances lead one to feel insecure and anxious about oneself and others, resulting in a sense of vulnerability, and potentially rendering the attachment system continually activated. The continual activation of the attachments system can interfere with normal functioning, and cause one to remain preoccupied with external threats and the desire for protection (Bowlby, 1982).

Negative experiences with attachment figures theoretically function to alert an individual to the fact that their primary strategy of proximity seeking is not working, which may lead to the employment of one of two secondary strategies – hyperactivation (maximising) or deactivation (minimising) (Dozier, Stovall-McClough, & Albus, 2008; Main, 1990). Hyperactivation, or what Bowlby (1982) called protest, tends to be more common where an attachment figure demonstrates inconsistency in responsiveness (i.e. they are sometimes responsive and sometimes not), and is characterised by an individual intensifying bids for proximity seeking in order to force or demand attention and support. Conversely, deactivation, or what
Bowlby (1982) termed *compulsive self-reliance*, occurs when an individual learns from a consistently unavailable caregiver that better outcomes may be achieved if expressions of vulnerability or need are suppressed, and proximity-seeking attempts are blocked.

According to attachment theory, variations in attachment figure responses to proximity seeking do not just alter the operation of the attachment system in the short-term; they also lead to pervasive and enduring patterns of behaviour in the long-term. The cognitive aspect of attachment theory relates to what Bowlby (1982) termed *working models* – mental representations of transactions between individuals and their environments. Theoretically, individuals create working models in relation to specific attachment figures (i.e. a parent or caregiver), which subsequently form excitatory and inhibitory links with other attachment figures. As summarised by Yates (2004), when these links are reinforced, working models of the self and others are produced. In the context of the attachment relationship, one internalizes a sense that others are unreliable or reliable, and threatening or protective, and develops a parallel perception of oneself as undeserving or deserving of care, and as ineffective or effective at eliciting support, nurturance, and protection. Over time *attachment styles* may develop as a result of an individual’s most salient or accessible working model, with this attachment style then guiding future expectations, needs, social behaviour and emotions (Bowlby, 1988; Fraley & Shaver, 2000; Shaver & Hazan 1993). Attachment styles can be measured in terms of a particular relationship (*relationship-specific*), or across all relationships (*global*) (Shaver & Mikulincer, 2009).

At this point it is important to mention that the development of working models does not occur in a simplistic or necessarily linear manner. It appears that individuals possess a hierarchical associative network that includes episodic
memories, relationship-specific models, and general working models of others and the self (Fletcher & Friesen, 2003). As Bowlby (1980) initially suggested, individuals are generally able to recall positive security-enhancing interactions, as well as negative security-eroding interactions with key attachment figures (Baldwin, Keelan, Fehr, Enns, Koh Rangarajoo, 1996). Within a hierarchical memory network, the model that is most accessible is determined by a number of issues, such as the amount of times it has been reinforced and how salient it is to a current concern or situation (Baldwin, 1992; Collins & Read, 1994). This indicates that the attachment process can be highly contextual, and working models are likely to be triggered by memories and/or recent events.

Ainsworth (1967) was the first to propose the concept of attachment patterns as a way of classifying behavioural responses to caregivers. Originally, infants were classified as secure, anxious-ambivalent, or anxious avoidant. Over time, theorists and researchers made improvements to the conceptualisation and measurement of attachment-related patterns. A fourth category, disorganised/disorientated was later added (Main & Soloman, 1990). Authors have also proposed an unresolved category for individuals who cannot easily be classified, relating this to experiences of trauma or abuse (Hesse, 1999; Lyons-Ruth, Yellin, Melnick, & Atwood, 2005). Theoretical postulations and empirical findings progressively converged on the notion that attachment styles may be best conceptualised as dimensional constructs that change over time, rather than fixed styles. As summarised by Shaver and Mikulincer (2009), attachment styles are viewed as comprising two dimensions: (1) attachment-related avoidance, which is characterised by deactivating affect-regulation strategies, discomfort with closeness or dependence on others, and a preference for self-reliance, and (2) attachment-related anxiety, which involves hyperactivating strategies,
pervasive need for closeness or protection, excessive worry about one’s own value, and constant concern regarding the availability and responsiveness of attachment partners. If an individual is found to be low on both the anxiety and avoidance dimensions of attachment, they are said to have a secure attachment style – characterised by comfort with the idea of dependence and intimacy, lack of concern with being abandoned, trust regarding partner availability and responsiveness, and ability to regulate emotions and cope with distress in a constructive, problem-focused manner.

The attachment styles that individuals possess take root in childhood and are carried into adulthood where they influence behaviour in close relationships and impact social perception (Collins & Allard, 2003). As summarised by Yates (2004), it is theorised that repeated interactions in the attachment relationship provide a basis for an individual’s emergent sense of self and expectations regarding other people, influencing the capacity to engage in empathic and reciprocal relationships. Where this becomes clinically relevant is where insecure attachment styles become associated with maladaptive behaviour patterns and psychopathology.

Theoretically, because insecurely attached individuals are preoccupied with the availability of attachment figures, they become unable to accurately appraise environmental stimuli without cognitive bias, and thus are considered to be at risk of psychopathology (Dozier, Stovall-McClough, & Albus, 2008). In addition to this, from a developmental perspective, patterns of dyadic interaction and regulation in early development impact processes in the brain that underlie one’s capacity for arousal modulation and ability to adapt to stressors (Main & Soloman, 1990; Sroufe, 1995). Thus, regulatory patterns originating in the dyadic caregiving relationship
strongly influence one’s emergent competence across multiple levels of adaptation (Main & Solomon, 1990; Sroufe, 1995).

Historically, research has found associations between attachment theory and a number of clinical presentations, including mood disorders, anxiety disorders, dissociative disorders, eating disorders, schizophrenia, and personality disorders (Dozier et al., 2008). More recently, researchers and clinicians have begun to question whether attachment theory may provide an explanatory framework for perplexing acts such as NSSI.

Authors such as Linehan (1993a, 1993b) have proposed that factors such as an invalidating family environment and emotional neglect are important to the development of BPD and NSSI, and recent empirical research supports the claim that factors such as parental support, parental criticism, and perceived emotional support are related to self-injury (i.e. Baetens et al., 2014a; Baetens et al., 2014b). Similarly, van der Kolk, Perry and Herman (1996) suggested that childhood trauma, neglect, and insecure attachment may interact to influence the development of behaviours such as NSSI. Tantam and Whittaker (1992) also theorised that childhood abuse in the context of pathological family relationships may place an individual at greater risk of developing NSSI behaviours. Such assertions have provided a rationale for researchers to test the association between NSSI and attachment.

The next subsection discusses and critiques the empirical literature assessing the relationship between attachment and NSSI. Following this, section 3.3 includes an overview of the main theories underpinning the proposed link between attachment and NSSI.
3.2 Attachment and Non-Suicidal Self-Injury: Empirical Research

While only a few studies have been published that examine the associations between NSSI and attachment, initial findings appear to support the hypothesis that individuals are more likely to engage in NSSI if they possess an insecure attachment style (Gormley & McNiel, 2010; Gratz, Conrad, & Roemer, 2002; Hallab & Covic, 2010; Kimbal & Diddams, 2007; Levesque, Lafontaine, Bureau, Cloutier, & Dandurand, 2010; Stepp, et al., 2008).

Gratz, Conrad and Roemer (2002) have provided preliminary support for the role of early caregiver relationships in the development of NSSI. In a cross-sectional survey study of undergraduate university students, Gratz and her colleagues found that insecure attachment to father figures was associated with NSSI in female participants, but not male participants. While this is certainly an important finding, these authors have been criticised for their reliance on retrospective measurement of childhood attachment and their assumption that attachment remains completely stable across the lifespan (Hallab & Covic, 2010; Kimball & Diddams, 2007). The current view of the attachment process is that, although childhood experience is highly important, attachment in adulthood may be influenced by multiple stages of development, whereby information from attachment-relevant experiences in adolescence and adulthood can be assimilated into working models (Bowlby, 1982; Mikulincer & Shaver, 2007). It therefore appears to be more appropriate to measure current attachment styles when looking at current NSSI behaviours, as subsequent authors have sought to do (Gormley & McNiel, 2010; Hallab & Covic, 2010; Kimbal & Diddams, 2007; Levesque, Lafontaine, Bureau, Cloutier, & Dandurand, 2010; Stepp, et al., 2008).
Although the majority of studies have considered NSSI in relation to global attachment styles, recent research has aimed to isolate relationship-specific styles. This particular approach appears important given the earlier assertion that individuals may develop diverse working models across multiple attachment figures. By separating mother, father, and peer attachment, Hallab and Covic (2010) found that participants prone to NSSI reported poor attachment with their parents, but that they did not differ from those without a history of NSSI in terms of peer attachment. This finding suggests that early relationships may impact upon the development of NSSI behaviours more than current or later relationships. A concern with Hallab and Covic’s approach, however, lies in their use of the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987). Specifically, these authors employed a university sample, whereas the IPPA was designed for adolescent cohorts. Moreover, the scale measures perceived trust, communication, and alienation, rather than providing scores for the core anxiety and avoidance dimensions of attachment (Lopez & Gover, 1993). An additional concern is that Hallab and Covic employed a small sample of participants (N=114), limiting the generalisability of their findings.

Somewhat contradictory to Hallab and Covic’s findings, Levesque, Lafontaine, Bureau, Cloutier, and Dandurand (2010) found that current romantic partner attachment may be important in predicting NSSI thoughts in university-aged men, and NSSI thoughts and behaviours in university-aged women. Compared to Hallab and Covic, Levesque et al. recruited a larger sample for their study (N=537) and employed an arguably more accurate measure of attachment for their population – the Experiences in Close Relationships Scale (ECR; Brennan, Clark, & Shaver, 1998). Nevertheless, this study was characterised by a significant gender bias, with authors employing a sample of mostly women, which limits the generalisability of findings.
Further, as this study did not measure parental and peer attachment, it is difficult to determine whether romantic partner attachment is any more or less strongly associated with NSSI for this population relative to other attachment relationships. Taken together, however, these studies suggest that attachment relationships may be differentially important in contributing to NSSI, highlighting the need to systematically examine the relative importance of mother, father, peer, and romantic partner attachment.

While the majority of research in this area utilizes cross-sectional methodology, recently a longitudinal research study by Tatnell, Kelada, Hasking, and Martin (2013) conducted over a 12-month period found support for the notion that attachment insecurities in child-parent relationships may lead to the development of NSSI. These authors reported that parental attachment anxiety was associated with the onset of NSSI in a large (N = 1973) sample of adolescents aged between 12 and 18 years. Parental attachment was one of several intrapersonal and interpersonal variables examined by Tatnell and her colleagues, suggesting that a complex array of factors likely influence NSSI behaviours. Nonetheless, these authors reason that familial support may be particularly important in preventing NSSI.

Beyond the notion that poor attachment may be related to NSSI, researchers have begun to consider mediating variables that may act as proximal risk factors (Hallab & Covic, 2010; Kimball & Diddams, 2007; Stepp et al., 2008). In this way, insecure attachment resulting from early experiences with caregivers has been conceptualised as a distal risk factor (Stepp et al., 2008), in that it has an indirect effect on psychopathological outcomes (Fliege, Lee, Grimm, & Klapp, 2009). Empirical research suggests that while insecure attachment in and of itself is associated with the development of NSSI tendencies, immediate factors such as
interpersonal problems (Stepp et al., 2008), affect regulation (Kimball & Diddams), depressive symptoms (Gormley & McNiel, 2010), and stress (Hallab & Covic, 2010) may partially mediate the relationship. Most findings regarding risk factors for NSSI have not, however, been replicated, and the relative importance of each of these proposed factors on the development and maintenance of NSSI has not been tested.

As described above, an interesting link between attachment and NSSI appears to exist, whereby insecurely attached individuals may be more likely to resort to self-destructive actions to reduce anxiety or cope with stressful circumstances (Wright, 2005). However, it is apparent that the empirical literature in this area is preliminary. Beyond the concerns that have been highlighted throughout this subsection, diverse methodologies (in terms of both the populations targeted and the measures used) render it difficult to compare and contrast results from different studies, which is problematic for those seeking to understand the nature of the relationship between attachment and NSSI. Furthermore, there are facets of this relationship that have not been adequately explored, such as whether or not substantial differences exist between subtypes of insecure attachment, and whether attachment styles explain frequency (or likelihood of repetition) of NSSI. Future research is needed, therefore, to examine the apparent pathway between attachment and NSSI.

With this preliminary research outlined, the following subsection reviews the major theoretical understandings for the proposed association between insecure attachment and NSSI.

### 3.3 Theoretical Links Between Attachment and Non-Suicidal Self-Injury

As outlined in Chapter 2, although there are methodological concerns with the reliance on retrospective data, research findings converge to indicate that trauma and
stressful events in childhood make people more vulnerable to engaging in NSSI later in life (Fliege, Lee, Grimm, & Klapp, 2009). Nevertheless, it may be simplistic to state that experiences of trauma will necessarily lead to the development of NSSI, and it is suggested that other factors are possibly also at play. Attachment theory may provide a framework for understanding how stressful childhood events may render someone more vulnerable to developing NSSI behaviours than others.

Yates (2004) reasons that insecure attachment (which can be defined as high levels of attachment-related anxiety and/or avoidance) may make an individual more vulnerable to NSSI in adolescence and adulthood, and has provided two hypotheses to explain this. Firstly, Yates states that negative views and expectations of the self, others and the self in relation to others (which are theoretically developed as a result of insecure attachment relationships) may act to isolate one from the social world and accompanying social supports in the aftermath of a stressful event or trauma. This may render someone more vulnerable to NSSI because of an inability to cope. Secondly, Yates reasons that traumatic experiences in the care-giving environment may lead to adaption vulnerabilities, such as the tendency to dissociate, which in turn has been shown to contribute to NSSI.

As alluded to in Yates’ (2004) explanation, childhood attachment may be implicated in the development of dissociative symptoms, which may in turn lead to the development of NSSI due to the assertion that it can function to allow an individual to feel grounded and “real” during episodes of dissociation (Gunderson, 1984; Klonsky, 2007). According to attachment theorists (Liotti, 1992; Main & Hesse, 1990), frightened and frightening parental behaviours can lead to the development of disorganised attachment in children, which is characterised by an inability to integrate experiences into a meaningful and coherent inner life. This is
said to place children at risk of developing a dissociative disorder later in life (Lotti, 1992).

As described in Chapter 1, theorists have also proposed that NSSI may function as a form of self-directed abuse resulting from higher than normal tendencies to be self-critical, which may have been learnt during early childhood experiences (Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Klonsky, 2007; Nock, 2009; Nock & Prinstein, 2004). Attachment theory may serve as an explanation for the development of low self-esteem and a tendency to be overly self-critical. As Mikulincer and Shaver (2007) explain, insecurely attached individuals may incorporate the negative qualities of attachment figures into their own self-representations and then evaluate themselves in a disapproving manner. These authors also reason that insecurely attached individuals may set unrealistic, overly demanding self-standards as a way of coping with their insecurities, which may lead to self-criticism when goals are not fulfilled.

The relationship between attachment and NSSI may also be explained with reference to interpersonal theories of NSSI. As described in Chapter 1, research and theory suggest that individuals with a vulnerability to NSSI tend to become hyper-aroused during situations involving interpersonal stress and appear to be unable to access social-problem solving skills (Howat & Davidson, 2002; Kehrer & Linehan, 1996; Nock & Mendes, 2008; Prinstein, Guerry, Brown, & Rancourt, 2009). Attachment theory may provide an explanation for this, whereby individuals with insecure attachment styles, for instance, possess negative working models about themselves and other people that lead them to become highly distressed during social situations where they expect that others will view them unfavourably or let them down. The social signalling hypothesis of NSSI may also be important here. As
mentioned in the previous subsection, heightened levels of attachment-related anxiety tends to be characterised by hyperactivation (what Bowlby (1982) termed protest), whereby individuals intensify bids for proximity seeking and attention from inconsistent attachment figures. In extreme cases of invalidation and/or unresponsiveness, NSSI may function as a means of communication where other strategies have been unsuccessful (Nock, 2008; Wedig & Nock, 2007). As such, self-injury may be conceptualized as a means of avoiding abandonment and gaining attention or help (Allen, 1995).

While these explanations for the association between childhood attachment and NSSI have reasonable face-validity, many of them have not been empirically tested. While past research has documented the associations between insecure attachment and the development of dissociative symptoms (i.e. Anderson & Alexander, 1996; Calamari & Pini, 2003; Carlson, 1998; Ogawa, Sroufe, Weinfield, Carlson, & Egeland, 1997), low self-esteem and negative self-evaluation (i.e. Mikulincer, 1995; Salzman, 1996; Schmitt & Allik, 2005), and interpersonal difficulties (i.e. Bartholomew & Horowitz, 1991; Chen & Mallinckrodt, 2002), there is very little evidence that these associations necessarily cause an increased vulnerability to NSSI. As outlined above, recent cross-sectional findings suggest that the relationship between NSSI and attachment may be mediated by interpersonal problems (Stepp et al., 2008), depressive symptoms (Gormley & McNiel, 2010), and stress (Hallab & Covic, 2010), however, the methodology of these studies negates the drawing of causal inferences. As such, while research has demonstrated that attachment appears to be related to NSSI, researchers and clinicians have little empirically validated knowledge of the process behind this association.
In seeking to develop a greater understanding of the role of attachment relationships in NSSI, another construct that has been explored is emotion regulation. There is a body of work on the relationship between insecure attachment and difficulties regulating emotions and coping with distress. Although Bowlby’s (1982) primary focus was not devoted to the nature of emotions per se, he was intrigued by the emotions aroused by the attachment process, and the causes and behavioural consequences of these emotions, as well as their impact on communication and social adjustment. While a range of factors can contribute to differences in emotion regulation skills (Thomson, 1994), attachment history appears to be important. According to attachment theory children learn through their parents which emotional response will allow them to both obtain their immediate goals and conform to social demands (Cassidy, 1994; Main, 1990; Thompson, 1994). Cassidy (1994) reasons that while securely attached individuals possess the flexible ability to integrate and accept emotions that are both positive and negative, insecurely attached individuals tend to either limit (in the case of avoidance) or heighten (in the case of anxiety) their experiences of negative affect. In a review of the extant literature, Mikulincer and Shaver (2007) demonstrated that the theoretical link between childhood attachment and emotion regulation has been supported by an extensive number of empirical studies. Differences in attachment styles have been found to impact support seeking tendencies (i.e. Florian, Mikulincer, and Bucholtz, 1995; Larose, Berier, Souey, & Duchesne, 1999), beliefs about being able to cope (i.e. Buelow, Lyddon, & Johnson, 2002; Wei, Heppner, & Mallinckrodt, 2003), coping strategies (i.e. Marshall, Serran, & Cortoni, 2000; Mikulincer & Florian, 1998), and emotional reactions (i.e. Berant, Mikulincer, & Florian, 2001; Maunder, Lancee, Nolan, Hunter, & Tannenbaum, 2006). Although neuropsychology is not the focus of the current review, it is
important to note that there is also an extensive literature base by authors such as Allan Schore (i.e. Schore, 2000) reporting on the influence of early attachment relationships on the development of regions of the brain that assist with emotion regulation. Authors such as Linehan (1993a) have also suggested that affect regulation is important to the development and maintenance of NSSI, with the notion that individuals may engage in NSSI due to a pervasive difficulty managing distress that has originated in childhood. Theoretically, insecure attachment in early childhood may lead to difficulties regulating emotions, which may in turn impact upon the subsequent development of NSSI.

While empirical studies have recently been conducted to test the theoretical pathway from attachment to emotion regulation and NSSI, they are characterised by significant methodological flaws. For instance, Kimball and Diddams (2007) propose that securely attached individuals exhibit adaptive affect regulation strategies, while insecurely attached individuals engage in NSSI due to the inability to effectively regulate emotions. They employed structural equation modeling techniques and reported that affect regulation mediated the relationship between insecure attachment and NSSI. The Affect Regulation Scale (ARS; Schaffer, 1993) that Kimball and Diddams used, however, fails to explicitly measure emotion regulation. While emotion regulation encompasses several processes (as will be discussed in Chapter 4), the ARS is more accurately a measure of regulation strategies and, as previous authors have highlighted (Gratz & Roemer, 2004), it is an inherently problematic measure due to the fact that it involves subjective judgements regarding the adaptive advantage of one strategy over another. Similarly, while Gormley and McNiel (2010), and Hallab and Covic (2010) postulate the link between attachment and NSSI in relation to emotion regulation, they do not actually measure this construct in their studies. As
such, while it appears that emotion regulation may play an important role in mediating the relationship between attachment and NSSI, to date this pathway has not been empirically validated.

3.4 Chapter Summary

Attachment theory holds that patterns of interactions in the infant-caregiver relationship give rise to one’s emergent sense of self, perceptions and expectations of others, capacity to engage in healthy relationships, and ability to regulate emotion. Repeated negative interactions may lead to the formation of insecure attachment styles, which may render an individual at greater risk of developing psychopathology and a tendency to engage in maladaptive behaviours such as NSSI. Recent empirical research has demonstrated support for a correlation between attachment and NSSI, however, these findings are preliminary in nature. Further research is required to confirm this association, and to examine the relative importance of specific attachment relationships.

A number of theories have been put forward to explain the proposed relationship between attachment and NSSI. These include notions that insecure attachment leads people to engage in NSSI because of tendencies to have poor self concepts and not seek support in times of stress; to dissociate in response to distress; to engage in self-directed abuse due to high levels of self-criticism; to have reduced problem-solving skills in the context of interpersonal distress; and to utilize destructive behaviours for proximity seeking. While aspects of these notions are supported by research, many of these theories have not been empirically validated in their entirety. The idea that emotion regulation and coping may, in part, mediate the relationship between attachment and NSSI behaviours has begun to gain currency.
among researchers, however, there have been inherent flaws in the design and methodology of the few studies that have aimed to test this mediation model. Further research is required to determine whether difficulties in emotion regulation may mediate the relationship between attachment-related avoidance and/or anxiety and NSSI.

As there is a body of research examining the role of emotion regulation and coping in the development and maintenance of NSSI, Chapter 4 provides a review of these constructs and the empirical literature in this area.
Chapter 4: Emotion Regulation, Coping and Non-Suicidal Self-Injury

Broadly speaking, emotions are a normal and necessary component of human experience that have the potential to both enhance and undermine one’s functioning depending on the way in which they are managed or regulated. Appreciating the process of emotion regulation allows one to comprehend the way in which multiple individuals experience similar situations differently, providing a basis for understanding personality, social functioning and mechanisms such as coping strategies. In conjunction with the attachment literature outlined in Chapter 3, an understanding of emotion regulation processes can contribute to knowledge relating to the development and maintenance of complex maladaptive behaviours such as NSSI. This chapter defines and discusses emotion regulation and related constructs. Theories that link differences in emotion regulation and coping to psychopathology are outlined, and the existing empirical research in this area is reviewed.

4.1 Emotion Regulation and Associated Constructs

As aptly stated by Thompson (1994), “the term emotion regulation does not refer to a unitary phenomenon but is rather a broad conceptual rubric encompassing a range of loosely related processes” (p.30). These loosely related processes involve biologically and environmentally based constituents, all of which are said to impact upon the way in which individuals experience emotional arousal. Thompson calls emotion regulation “the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one’s goals” (pp.27-28). Breaking this definition down,
Thompson posits that external influences and internal self-monitoring equally contribute to the effective regulation of emotion. Secondly, Thompson refers to the notion that emotion management tends to subdue or enhance the intensity of a given emotion, as well as affect its persistence over time. It is reasoned that emotion regulation may involve inhibiting emotional arousal just as it may involve maintaining or enhancing it, with an emphasis on modulation rather than elimination. The final component of Thompson’s definition is related to the perspective that emotion regulation is functional, that is, it allows an individual to achieve particular objectives.

Gross (1998) broadly define emotion regulation as “the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions” (p.275). He puts forward five sets of emotion regulation processes, including situation selection, situation modification, attentional deployment, cognitive change, and response modification. Somewhat derivative of Gross’ conceptualisation, although with a greater emphasis on the role of awareness and acceptance, Gratz and Roemer (2004) have recently reasoned that emotion regulation is comprised of several elements – “(a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands” (pp. 42-43). According to Gratz and Roemer, emotion dysregulation can be described as maladaptive methods of responding to emotions – including difficulty controlling behaviours while emotionally distressed, failure to accept negative emotions, and deficits when it comes to using emotional information functionally. On the basis of this definition, Gratz and Roemer developed the
Difficulties in Emotion Regulation Scale (DERS) to assess functioning across multiple domains of emotion regulation.

As alluded to in the above definitions, it is important to specify that adaptive regulation of emotion does not involve attempts to control or avoid negative emotions (Hayes, Strosahl, & Wilson, 1999; Hayes, Wilson, Gifford, Follette, & Strosahl 1996). Authors such as Hayes, Wilson, Gifford, Follette and Strosahl (1996) discuss that attempts to control or suppress negative emotions in the short-term may be maladaptive in that it can result in greater distress in the longer-term. Both Thompson (1994) and Gratz and Roemer’s (2004) conceptualisations are consistent with the view that emotion regulation is not purely synonymous with the control and reduction of emotional arousal through coping strategies, but that it also involves the ability to behave in a desired way in the presence of emotions.

There are a number of additional constructs associated with the idea of managing and regulating emotions in the face of stressors. Some of these focus on earlier stages of the emotion regulation process involving awareness and understanding of emotions, while others examine the cognitive and behavioural strategies that individuals implement in the face of stressors. One of these terms is emotional intelligence, which Mikolajczak, Nelis, Hansenne and Quoidbach (2008) conceptualise as an emotion-related trait made up of a number of personality dispositions associated with the “perception, processing, regulation, and utilization of emotional information” (p.1356). Mikolajczak and her colleagues (2008) contend that emotional intelligence may explain individual differences in emotion regulation, while other authors (Leible & Snell, 2004) have conceptualised emotion regulation as one of many components of the broader construct of emotional intelligence. Two
other concepts that have been discussed in relation to the emotion regulation and NSSI literature are alexithymia and coping. These are defined below.

4.1.1 Alexithymia

Originating in the late 1960’s to 1970’s, alexithymia was a term used to describe the emotional deficits of patients with psychosomatic diseases (Taylor, 2004). Translating quite literally to “no words for emotions”, today alexithymia is used much more widely to refer to (1) marked difficulty identifying feelings and distinguishing between feelings and bodily sensations, (2) difficulty describing feelings to others, (3) constricted imaginary processes and impoverished fantasy life, and (4) a pattern of externally orientated thinking (Taylor, Bagby, & Parker, 1997). As one’s level of alexithymia has been shown to remain fairly unchanging over time, scholars often consider it to be a stable trait (De Timary, Luts, Hers, & Luminet, 2008; Mikolajczak & Luminet, 2006; Saarijärvi, Salminen, & Toikka, 2006; Stingl, et al., 2008). The stability of alexithymia has contributed to the conceptualisation of alexithymia as constituting a vulnerability factor for the psychological disorders it has been empirically associated with, rather than merely a state-dependent phenomenon (Mikolajczak & Luminet, 2006).

Gratz and Roemer (2008) consider alexithymia to be a dimension of emotion regulation that encompasses emotional inexpressivity as well as deficits in emotional clarity and awareness. Essentially, alexithymia relates to the process of recognising and labelling emotions, which appears to be the critical first step in doing something to manage or cope with a given stressor.

While the view that alexithymia relates to a process of emotion regulation appears valid, it can be argued that scales like the DERS (Gratz & Roemer, 2004) do
not adequately measure alexithymia as defined by Taylor, Bagby and Parker (1997). While the DERS does incorporate AWARENESS and CLARITY factors that are aimed to assess how attentive one is to one’s emotions, the associated items on these subscales ultimately fail to capture the ability to accurately label and articulate feelings – which are core to the concept of alexithymia. This suggests that researchers may need to examine alexithymia as a separate construct in addition to other factors of emotion regulation captured by measures like the DERS.

4.1.2 Coping

The concept of coping is broad, with a long and complex history within the theoretical and empirical literature (Compas, Connor-Smith, Saltzman, Thomsen & Wadsworth, 2001; Folkman & Moscowitz 2004). Coping pertains to a reaction or response to a negative event or external stressor (Endler and Parker 1990; Folkman & Lazarus, 1980, 1988; McCrae, 1984), and can generally be defined with reference to efforts aimed at diminishing or preventing harm, threat and/or loss, or to reduce associated emotional distress (Carver & Connor-Smith, 2010). There are differing perspectives on the behaviours that encompass coping, with some authors positing that the term should include involuntary or automatic processes (Skinner & Zimmer-Gembeck, 2007), while others state that it should only apply to voluntary responses (Compas et al., 2001). For the purposes of the current review, the conceptualisation of coping will remain limited to behavioural responses that are conscious and voluntary, thus removing reactions that are said to be unconscious and involuntary.

There is a great deal of contention regarding the conceptualisation of coping and coping styles within the literature. As reviewed by Parker and Endler (1992), part of this relates to a distinction between the intra-individual and inter-individual
approach to the study of coping. As asserted by these authors, however, researchers in this area typically seek to aggregate or collect the coping strategies individuals tend to use across various situations, to measure individual differences in general coping styles. It is reasoned that there is an enormous number of strategies that individuals can use to cope with external stressors or negative events, but that these can be classified or clustered around a small number of basic dimensions or styles.

There is a great deal of contention in the literature regarding the way in which coping styles and strategies should be categorized, and numerous self-report measures have been developed to reflect this. Readers are directed to Parker and Endler (1992) a comprehensive review. Broadly speaking, the lack of clarity in this area has significant implications for research. This aside, perhaps the most prominent conceptual model that has been put forward was developed by Lazarus and his colleagues (Folkman & Lazarus, 1980; Lazarus, 1991; Lazarus & Folkman, 1984), who distinguish between problem-focused and emotion-focused coping. Problem-focused coping refers to action-orientated strategies that deal directly with a problem or stressor, and in turn act to alter the person-environment relationship. Emotion-focused coping (also known as cognitive coping) involves attempts to alter the way a stressor is interpreted or attended to. The latter form of coping refers to strategies that mainly involve thinking rather than acting, and are aimed at changing the emotional reaction or meaning assigned to a stressor. Emotion-focused coping can also involve attempts to avoid or escape stimuli associated with stress or negative affect. Through the development of the Ways of Coping Questionnaire (Folkman & Lazarus, 1985; Folkman & Lazarus, 1988; Folkman & Lazarus, 2005), Lazarus and his colleagues proposed that coping can be further classified into eight factors: (1) confrontative coping, (2) distancing, (3) self-controlling, (4) seeking social support, (5) accepting
responsibility, (6) escape-avoidance, (7) planful problem-solving, and (8) positive reappraisal.

An alternative method of categorizing coping involves distinguishing between (i) engagement or approach coping, and (ii) avoidance or disengagement coping (Maddi, 1980; Roth & Cohen, 1986). Engagement coping is said to involve dealing directly with a stressor or associated emotions. This form of coping is similar to problem-focused coping, however, it can also involve aspects of emotion-focused coping, such as cognitive strategies that lead to the reappraisal of a stressor. The second category, disengagement coping, relates to attempts to escape from the threat or associated emotions. This is qualitatively similar to forms of emotion-focused coping aimed at avoiding or distancing oneself from a stressor.

Seeking to incorporate constructs of problem- and emotion-focused coping, as well as alternative notions of approach and avoidance coping, researchers Tobin, Holroyd, Reynolds, and Wigal (1989) developed a hierarchical model of coping. Based largely on the Ways of Coping Questionnaire, these authors proposed eight primary coping strategies (Problem Solving, Cognitive Restructuring, Social Support, Express Emotions, Problem Avoidance, Wishful Thinking, Self Criticism, and Social Withdrawal), and found that these could be classed as dimensions of engagement and disengagement coping, as well as problem- and emotion-focused coping. Their model is represented in Figure 2 below. The Problem Solving dimension refers to behavioural and cognitive strategies designed to directly deal with a stressor and change a situation. Cognitive Restructuring refers to the use of cognitive strategies to view a stressor from a different perspective and thus alter its meaning. Social Support refers to seeking emotional support from others, such as friends and family members. Express Emotions refers to the release of emotions by allowing them to be expressed.
Problem Avoidance refers to attempts to deny or escape thoughts or actions related to a stressor. Wishful Thinking relates to passively hoping a situation will improve in the absence of cognitive reframing. Self Criticism refers to blaming and criticizing oneself for a situation. Finally, Social Withdrawal refers to retreating, avoiding social situations, and spending time alone in response to a stressor.

It is important to note that coping theorists such as Lazarus and his colleagues (Folkman & Lazarus, 1980; Lazarus, 1991; Lazarus & Folkman, 1984) do not posit that there is one form of coping that is uniformly adaptive or maladaptive across all situations. For instance, during circumstances where a concern is objectively out of one’s control (such as the death of a family member), it is unlikely to be helpful to employ an active problem-solving approach. It is reasoned that each strategy may be necessary at different times, and that each can function to facilitate another. As such, a component of effectively dealing with stress involves accurately appraising a situation and determining which strategy is most applicable or likely to be beneficial. This is similar to the perspective that adaptive emotion regulation involves being able to employ strategies flexibly as appropriate to the context (Cole, Michel, & Teti, 1994; Gratz & Roemer, 2004; Thomson, 1994).

![Hierarchical structure of coping](image-url)

Figure 2. Hierarchical structure of coping
With the above constructs in mind, the following subsection discusses the clinical relevance of emotion regulation, alexithymia and coping to the maladaptive behaviours involved in NSSI. This is firstly discussed in relation to theory, with the subsequent section providing a review of the extant empirical literature.

As an aside, it is important at this stage to note that there is significant overlap between emotion regulation, alexithymia and coping. For instance, while Tobin et al (1989) conceptualise cognitive restructuring as a coping strategy, authors such as Gross and John (2003) discussed cognitive reappraisal with reference to emotion regulation. Similarly, as discussed above, there are differences of option regarding whether alexithymia is a component of emotion regulation, or whether it is a distinct construct. With the terms emotion regulation and coping used somewhat interchangeably in the literature, the issue presents as a significant challenge for the conceptualisation, measurement, and interpretation of research findings.

4.2 The Clinical Relevance of Emotion Regulation, Alexithymia and Coping

The ability to effectively regulate emotions and emotion-related behaviour is an essential component of effective human functioning. In agreement with behavioural theories of psychopathology that place emphasis on the function of maladaptive and problematic behaviours (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), emotion regulation can be used to understand a diverse range of symptom presentations (Gross & Munoz, 1995). The most comprehensive theoretical literature available on the role of emotion dysregulation in a clinical condition has been Marsha Linehan’s (1993a) work with BPD. Linehan posits that one of the central features of BPD is an inability to effectively regulate emotions, and that this deficit underlies many problematic behaviours (including NSSI). In considering the nature of
the association between NSSI and emotion dysregulation, Linehan (1993a) proposes that emotion dysregulation mediates the relationship between NSSI and risk factors like childhood maltreatment. This theoretical understanding of emotion regulation has guided research, with authors explaining the relationship between NSSI and emotion dysregulation with reference to childhood abuse and trauma (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Pavio & McCulloch, 2004; Sim, Adrian, Zemen, Cassano, & Friedrich, 2009). It is reasoned that chronically stressful events in childhood may lead to difficulties regulating emotions and poor coping strategies, which may in turn render one vulnerable to resorting to NSSI during times of distress.

The notion put forward by Linehan runs parallel to theories regarding the function of NSSI, and is consistent with authors who suggest that NSSI is primarily a strategy to cope with emotions and deal with stress, and that it functions to control overwhelming and painful emotional experiences (Gratz, 2003; Haines & Williams, 2003). As outlined in Chapter 2, the experiential avoidance model (EAM; Chapman, Gratz & Brown) reasons that NSSI can be classed as an escape or avoidance behaviour that is negatively reinforced due to its function of decreasing or eliminating unwanted internal experiences (i.e. thoughts and feelings). With reference to the coping strategies discussed above, NSSI may therefore be classed as a form of emotion-focused and/or disengagement coping.

The theory linking alexithymia to NSSI is qualitatively similar to those linking emotion regulation to NSSI, due to the apparent overlap between these constructs. Specifically, due to difficulties in identifying and describing thoughts, feelings and bodily sensations, individuals with high levels of alexithymia are thought to be likely to demonstrate difficulty regulating or controlling emotions in the face of stressors, and may be vulnerable to avoidance techniques, poor problem-solving ability, and
maladaptive behaviours such as binge drinking (Taylor, 2004). If alexithymia is associated with emotion dysregulation and limited access to adaptive and flexible coping strategies, it may be perceived to be a risk factor for NSSI.

4.3 Emotion Regulation, Coping and Non-Suicidal Self-Injury: Empirical Research

Research has been guided by theory reasoning that NSSI can be conceptualised as a coping strategy and that it may serve a regulatory function in the face of negative affect, with a number of authors examining the relationship between NSSI, emotion regulation, alexithymia, and coping strategies. The available literature in this area is reviewed below.

4.3.1 Emotion Regulation and Non-Suicidal Self-Injury

Empirical studies to date support the idea that emotion regulation difficulties are important risk factors for the development of NSSI in a number of cohorts – including male and female university students (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Heath, Toste, Nedecheva, & Charlebois, 2008), clinical populations (Slee, Garnefski, Spinhoven, & Arensman, 2008), as well as individuals with substance use disorders (Gratz & Tull, 2010). Further, some studies have demonstrated that emotion regulation appears to be more important to the maintenance of NSSI over time relative to other risk factors, such as childhood maltreatment (Gratz & Chapman, 2007; Gratz & Roemer, 2008).

Unfortunately, few studies have examined the emotion-related functions of NSSI in adolescent cohorts, and have ultimately failed to capture the many facets of emotion regulation that may be important to the development and maintenance of
NSSI. As an example of this concern, Hilt, Cha, and Nolen-Hoeksema (2008) investigated the role of depressive symptoms and peer victimisation on NSSI in a sample of adolescent girls of diverse racial-ethnic background, finding that ruminating over depressive symptoms led participants to engage in NSSI as a means of automatic positive reinforcement (i.e. to feel something). While rumination may be considered a maladaptive method of responding to negative emotions, emotion dysregulation arguably comprises much more than this. In another study, Sim, Adrian, Zemen, Cassano, and Friedrich (2009), examined the roles of emotion regulation and family emotional climate in relation to adolescent NSSI, reporting that those who self-injured did so to reduce their negative emotional states, and that the relationship between family climate and frequency of NSSI was mediated by emotion regulation skills. Similarly to Hilt et al. in regards to limited measurement, Sim and her colleagues measured only emotional expression, rather than broader range of processes that is encapsulated by emotion regulation. More recently, Voon, Hasking and Martin (2014) report that ruminative thinking, cognitive reappraisal, and expressive suppression were related to NSSI, and other authors have reported that low cognitive reappraisal and high emotional suppression are associated with the continuation of NSSI over time (Andrews, Martin, Hasking, & Page, 2013). While findings are eminently valuable, these studies omit important facets of emotion regulation that may also be necessary to understanding adolescent NSSI.

Indeed, a concern with this area of research is the fact that while some authors employ the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) as a fairly comprehensive measure of emotion regulation (Buckholdt, Parra, and Jobe-Shields, 2009; Gratz & Chapman, 2007; Gratz & Roemer, 2008; Heath, Toste, Nedecheva, & Charlebois, 2008), others fail to capture the complexity of emotion
regulation in their experimental methods (Hilt, Cha, & Nolen-Hoeksema, 2004; Sim, Adrian, Zemen, Cassano, & Friedrich, 2009). Clinicians and researchers seeking to understand the role of affect-regulation in NSSI may therefore need to utilise more sophisticated and inclusive measures, and integrate findings from literature examining related (yet clearly distinct) components of emotion regulation.

Moreover, of those few authors that have employed the DERS scale to measure emotion regulation, findings regarding the subtypes of emotion regulation that appear to be most important in predicting NSSI are inconsistent. Specifically, while Gratz and Roemer (2008) and Heath, Toste, Nedecheva, and Charlebois (2008) agree that ‘limited access to emotion regulation strategies’ appears to be important in explaining NSSI, other factors put forward include ‘lack of emotional clarity’, ‘impulse control difficulties’, ‘nonacceptance of emotional responses’, and ‘difficulties engaging in goal directed behaviour’. Given that these individual areas of emotion regulation may act to guide targeted clinical intervention, it would be useful for future research to establish which elements of emotion regulation are the most important risk factors for NSSI.

In line with this assertion, it may be that emotion-related functions are differentially important over time, and could be distinguished in terms of proximal and distal risk factors. Specifically, as the theoretical literature suggests that individuals may ultimately engage in NSSI due to a lack of alternative and/or available strategies to immediately deal with distress (Nock, 2009), and as research confirms that individuals engaging in NSSI tend to believe that they do not have many methods for coping with distress (Gratz & Roemer, 2008; Heath et al., 2008), the STRATEGIES variable of emotion regulation may be the factor which immediately precipitates NSSI. Consistent with theories that avoidance and failure to accept
emotions may lead to longer-term distress (Hayes, Wilson, Gifford, Follette, & Strosahl 1996), tendencies to experience lack of clarity and nonacceptance of emotional responses may be more distally related to NSSI. Future research is therefore needed to examine the pathways between various factors of emotion regulation in predicting NSSI.

Finally, a methodological concern with the current literature relates to the assertion that the majority of studies (including Gratz & Chapman, 2007; Gratz & Roemer, 2008; Heath, Toste, Nedecheva, & Charlebois, 2008) rely on relatively small samples of participants, comprised mostly of college or undergraduate students. This reliance on convenience sampling limits the reliability and generalisability of studies, thus compromising the clinical utility of findings. This area of research would therefore benefit from studies employing a more representative sample of participants.

4.3.2 Alexithymia and Non-Suicidal Self-Injury

Given that the inability to regulate and express emotional experience appropriately has been empirically linked to NSSI (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Gratz & Tull, 2010; Heath, Toste, Nedecheva, & Charlebois, 2008; Slee, Garnefski, Spinhoven, & Arensman, 2008), and that self-injury is thought to be a direct response to unmanageable distress (Paivio & McCulloch, 2004), one can hypothesise that alexithymia is related to NSSI. Nevertheless, although alexithymic qualities have been associated with borderline pathology (Modestin, Furrer, & Malti, 2004) and suicidal ideation (Hintikka et al., 2004), the role of alexithymia in NSSI has only been examined in a few studies to date.

In the first of these studies, Zlotnick et al. (1996) reported that female inpatients on a psychiatric unit who were engaging in NSSI demonstrated higher rates
of alexithymia, dissociation, and sexual abuse, than those without NSSI tendencies. Similarly, Pavio and McCulloch (2004) sought to examine the relationships between NSSI, childhood trauma and alexithymia in a small ($N=100$) group of undergraduate students. From their findings, these authors proposed a model of NSSI whereby experiences of trauma in childhood may result in poor development of emotion processing capacities (alexithymia), which in turn leads to unhealthy and self-destructive methods of coping with stress later in life (NSSI). Evren and Evren (2005) also find support for the role of alexithymia in NSSI in a sample of 136 substance-dependent male inpatients, reporting that childhood abuse was somewhat implicated in maladaptive behaviour patterns of drug abuse and NSSI, and that self-mutilating participants demonstrated higher levels of alexithymia than those without a history of NSSI. A recent study by Swannell and her colleagues (2012) provides further support for the notion that the relationship between childhood maltreatment and NSSI may be partially mediated by alexithymia in female respondents. Finally, Garish and Wilson (2010) discuss the role of alexithymia in negative outcomes associated with interpersonal difficulties. Investigating NSSI in a group of New Zealand secondary school students, these authors reported that both social factors (interpersonal relationships) and poor emotion competence (alexithymia) contributed to NSSI behaviours. Garish and Wilson found that alexithymia partially mediated the relationship between bullying and NSSI, suggesting that competently understanding, identifying and describing emotions is important for protecting adolescents from NSSI when interpersonal problems are involved.

As a general point, it is acknowledged that there may be limitations associated with research on alexithymic individuals, given that difficulties identifying emotions may somewhat influence responses to self-report questionnaires. Despite this, from
the few studies that have been conducted, there seems to be a developing consensus that alexithymia is implicated in NSSI where some form of trauma or external social pressure has led to extreme and overwhelming distress. As Sim, Adrian, Zeman, Cassano, and Friedrich (2009) aptly state, “individuals who are impoverished in their awareness of emotions may have associated difficulties generating adaptive responses that could erode their confidence in navigating emotion eliciting situations” (p.77). Theoretically, alexithymic tendencies, such as the inability to recognise and distinguish feelings, can be perceived as distal risk factors that increase individuals’ vulnerability to resorting to self-injury due to difficulties adaptively engaging in subsequent, and more proximal, facets of emotion regulation and coping. Nevertheless, research in this area is fairly preliminary. Only a relatively small number of studies have been completed, and they are all reliant on cross-sectional data. As yet, research has not examined the relative importance of alexithymia and other facets of emotion regulation in predicting NSSI, nor the possible pathways between these factors.

4.3.3 Coping and Non-Suicidal Self-Injury

There is a body of research examining the broader coping styles of individuals who engage in NSSI behaviours. Studies have revealed that NSSI is associated with greater emotion-focused and/or disengagement coping (Andover, Pepper, & Gibb, 2007; Andrews, Martin, Hasking, & Page, 2013a; Cawood & Huprich, 2011; Williams & Hasking, 2010) and decreased problem-focused, rational, or engagement coping (Andover et al., 2007; Cawood & Huprich, 2011; Hasking et al., 2010). Coping styles have also been posited to mediate the relationship between personality disorder symptoms and NSSI (Cawood & Huprich, 2011). Emotion-focused coping
has also been found to be a moderating factor in the relationship between NSSI and psychological distress (Williams & Hasking, 2010). Some examples of emotion-focused coping strategies that have been shown to be more likely to be reported in participants with NSSI are self-isolation (Christian & McCabe, 2011), avoiding the problem (Williams & Hasking, 2010), and using drugs and alcohol (Brown, Williams, & Collins, 2007).

A number of studies examining coping and self-injury have failed to distinguish between NSSI and suicide attempts. While this limits the validity of their findings in understanding the role of coping in NSSI, the reported findings have been largely consistent with the aforementioned literature. Multiple studies suggest that self-injury (including acts performed both with and without suicidal intent) is associated with higher levels of emotion-focused and/or avoidant coping (Borrill, Fox, Flynn, & Roger, 2009; Evans, Hawton, & Rodham, 2005; Kirchner, Forns, & Mohino, 2008; Marusic & Goodwin, 2006; McAullife et al., 2006; McMahon et al., 2011; Mikolajczak, Petrides, & Hurry, 2008; Santos, Saraiva, & De Sousa, 2009), and lower levels of rational or problem-focused coping (Borrill et al., 2005; Evans, et al., 2005; McMahon et al., 2011; Santos et al., 2009). In a study examining religious and ethnic differences in self-injury, Borrill, Fox and Roger (2011) found that participants of Black ethnicity reported lower rates of self-injury and higher rates of rational coping (defined as strategies that involve confronting a problem) than other groups. Their finding appears consistent with the notion that self-injury is associated with a tendency to engage in less problem-focused or active approach coping. A similar international study by Portzski, De Wilde and van Herringen (2008) comparing Dutch and Belgian adolescents revealed that self-injury was more common in Belgian adolescents who tended to show less problem-focused coping. In a critical review of
the literature, Guerreiro et al. (2013) reported that DSH (defined as self-injury performed with and without suicidal intent) was consistently associated with emotion-focused coping styles, and the use of avoidant coping strategies in particular. They also found that problem-focused coping tended to be negatively correlated with DSH, but reported that this finding was less consistent across extant studies.

As previously mentioned, there is growing support for the theory that NSSI may function as a coping strategy in and of itself (Chapman, Gratz, & Brown, 2006; Nock & Prinstein, 2004). Authors have highlighted the need for empirical research to further validate and elucidate the role of NSSI in reducing negative mood states, and recently ecological momentary assessment (EMA) procedures have been used to do so (Armey, Crowther, & Miller, 2011; Meuhlenkamp et al., 2009). EMA is a form of journaling or experience sampling that allows researchers to examine experiences and events in their natural environment or context (Bolger, Davis, & Refaeli, 2003). Employing EMA procedures, Meuhlenkamp and her colleagues (2009) revealed that peaks in negative affect and lowered positive affect preceded episodes of NSSI in 131 individuals with bulimia nervosa. They found that positive affect increased immediately after NSSI, while negative affect did not change in a statistically significant manner. A similar finding was reported by Armey, Crowther, and Miller (2011), who also employed EMA techniques with a group of 36 college students who engaged in NSSI. Armey and his colleagues found that negative affect increased prior to NSSI behaviours, peaked during the behaviours, and progressively decreased in the period following. The use of such real-world measurement techniques provides empirical evidence for the regulatory function of NSSI, and suggests that conceptualising NSSI as a coping strategy is appropriate. Very recently, EMA
technology has been used to complement treatment of NSSI on the basis of this assertion (Armey, 2012).

In sum, a number of empirical studies have suggested that individuals who engage in NSSI tend to report greater use of emotion-focused or disengagement coping, and less problem-focused or engagement coping. Despite this assertion, it remains difficult to understand the exact relationship between coping styles and NSSI. Part of the reason for this relates to the fact that many studies fail to distinguish between suicidal and non-suicidal acts. Potentially more problematic, however, is the apparent overreliance on cross-sectional data and retrospective reports regarding the array of coping mechanisms participants have used in the past or are likely to use in the future. Given the potential for bias inherent in this approach, it would be beneficial for future research to assess whether, when faced with daily stressors, individuals with and without NSSI behaviours show differential tendencies in which type of coping strategies they employ over time. Given that EMA methods can overcome the limitations of cross-sectional studies, and assess moment-to-moment change in affect and subsequent coping, they show promise for this purpose (Armey et al., 2011; Meuhlenkamp et al., 2009).

4.4 Chapter Summary

In conclusion, greater understanding of the processes involved in experiencing and managing emotions would increase our knowledge of the development and maintenance of NSSI. Elucidating the relationships between emotion regulation and coping could provide clinicians with a broader basis for understanding the form and function of NSSI. Authors such as Marsha Linehan (1993a) have suggested that skill
deficits in recognising and responding to emotions place individuals at greater risk of developing maladaptive coping strategies, one of which may be NSSI.

Recent empirical research supports the notion that individuals with a tendency to engage in NSSI may have difficulties in specific domains of emotion regulation. Authors appear to disagree, however, on which facet of emotion regulation may be most important in contributing to NSSI behaviours. As described in this chapter, it may be that certain factors (such as having a lack of strategies for managing strong emotions) are more proximally related to NSSI, and that others (such as alexithymia and non-acceptance of negative emotions) might be conceptualised as longer-term risk factors. Further research, however, is required to test these postulations.

Research has also supported the association between alexithymia and NSSI, with authors proposing that this construct may mediate the relationship between NSSI and childhood maltreatment. Research in this area remains relatively preliminary, however, and further studies are required to determine the relative importance of alexithymia and other related (yet distinct) facets of emotion regulation.

Recent studies employing innovative EMA technologies have demonstrated support for conceptualisations of NSSI as a mechanism that functions to reduce emotional distress, thus providing support for the affect-regulation model of NSSI. It is recommended that such real-time assessment methods be applied to other areas of research in NSSI. While individuals with a tendency to engage in NSSI may well be more likely to utilise avoidant, disengagement, or emotion-focused coping, and be less likely to engage in engagement or problem-focused coping when faced with stressors, inferences drawn from findings in this area have been heavily reliant on cross-sectional data and retrospective reports. Ecological momentary assessment methodology may provide a more rigorous tool to determine whether individuals with
a history of NSSI behaviours differ from those without NSSI behaviours in terms of the way in which they cope with stressors on a day-to-day basis.
Chapter 5: Study 1

The Association of Emotion Regulation and Attachment Relationships to NSSI

5.1 Overview

Study 1 of the current research project consisted of a cross-sectional survey investigating the relationships between NSSI, emotion regulation, alexithymia, and attachment-related avoidance and anxiety in specific relationships. This chapter firstly reminds readers of the gaps in the extant literature, before outlining the aims, hypotheses, and method of this study. The subsequent sections present and discuss the findings of the study.

5.2 Aims, Research Questions and Hypotheses

As outlined in previous chapters, existing literature on NSSI suggests that this range of behaviours may be explained by employing theories of affect regulation and attachment. Preliminary findings support the theory that individuals with insecure attachment styles may be more vulnerable to developing NSSI behaviours (Gormley & McNiel, 2010; Gratz, Conrad, & Roemer, 2002; Hallab & Covic, 2010; Kimbal & Diddams, 2007; Levesque, Lafontainse, Bureau, Cloutier, & Dandurand, 2010; Stepp, et al., 2008), however, there are concerns with the methodology of many existing studies, and future research is required to systematically examine the relative importance of specific attachment relationships in predicting NSSI. In addition to this, theoretical understandings regarding the relationship between attachment and NSSI have not been empirically validated. Future research is required to assess whether emotion regulation may mediate the relationship between attachment-related variables
and NSSI. Regarding the construct of emotion regulation, recent empirical research also demonstrates support for the notion that individuals with a tendency to engage in NSSI have skill deficits in various domains of emotion regulation (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Gratz & Tull; Health, Toste, Nedecheva, & Charlebois, 2008; Slee Garnefski, Spinhoven, & Arensman, 2008). Nevertheless, it remains unclear which factor of emotion regulation is most important in predicting NSSI behaviours, and whether or not there are pathways between these factors. As outlined in Chapter 4, it may be that certain factors are more proximally related to NSSI, while others may be conceptualised as distal and longer-term risk factors. Lastly, while preliminary research suggests that alexithymia may be an important risk factor for NSSI (Evren & Evren, 2005; Garish & Wilson, 2010; Pavio & McCulloch, 2004; Swannell et al., 2012; Zlotnick et al., 1996), the relative importance of this variable to other emotion regulation concepts has not yet been established.

Using cross-sectional survey methodology, Study 1 aimed to address the above gaps in the literature, examining the associations between NSSI, facets of emotion dysregulation, alexithymia, and specific attachment relationships. In the planning stages of the study, a number of research questions were posed:

RQ1: How accurately can group membership (NSSI versus non-NSSI) be predicted by measures of attachment in specific relationships, emotion regulation factors, and alexithymia?

RQ2: Which attachment, emotion regulation and alexithymia variables are most important in predicting NSSI?

RQ3: Is the relationship between NSSI and attachment-related variables mediated by difficulties with emotion regulation?
RQ4: What are the pathways between different emotion regulation factors in predicting NSSI?

In order to answer these four research questions, an empirical study was designed and five hypotheses were developed in line with the extant NSSI literature. These hypotheses are outlined below.

As reviewed in previous chapters, past research has demonstrated an association between NSSI and emotion dysregulation (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Gratz & Tull, 2010; Heath, Toste, Nedecheva, & Charlebois, 2008; Slee, Garnefski, Spinhoven, & Arensman, 2008), alexithymia (Evren & Evren, 2005; Garish & Wilson, 2010; Pavio & McCulloch, 2004), and insecure attachment styles (Gormley & McNiel, 2010; Gratz, Conrad, & Roemer, 2002; Hallab & Covic, 2010; Kimball & Diddams, 2007; Levesque, Lafontaine, Bureau, Cloutier, & Dandurand, 2010; Stepp, et al., 2008). Given these initial findings, the following hypothesis was made:

H1: There will be a positive zero-order relationship between NSSI, difficulties in emotion regulation, alexithymia, and attachment-related avoidance and anxiety in specific relationships.

Following on from this, as preliminary research has suggested that distinct attachment relationships may contribute to NSSI tendencies in diverse ways (Hallab & Covic, 2010; Levesque, Lafontaine, Bureau, Cloutier, & Dandurand, 2010), a second hypothesis was made:
H2: When all variables are included in the model, mother, father, peer and romantic partner attachment-related variables will be differentially important in predicting NSSI.

Thirdly, as preliminary research has found that NSSI is associated with deficits in specific domains of emotion regulation (Buckholdt, Parra, & Jobe-Shields, 2009; Gratz & Roemer, 2008; Heath, Toste, Nedeccheva, & Charlebois, 2008; Slee, Garnefski, Spinhoven, & Arensman, 2008), the following was hypothesised:

H3: When all variables are included in the model, emotion dysregulation factors will be differentially important in predicting NSSI.

In addition to this, existing theories relating NSSI to lack of access to coping strategies and low self-efficacy lend support for a hypothesis regarding pathways between emotion regulation factors. Specifically, given that theoretical literature suggests that individuals may ultimately resort to NSSI due to perceived lack of alternative and/or available coping strategies to immediately and effectively deal with distress (Nock, 2009), and as empirical research suggests that individuals engaging in NSSI tend to have low self-efficacy (Fliege et al., 2004) and believe that they have limited ways of managing emotions (Gratz & Roemer, 2008; Heath et al., 2008), it was determined that ‘limited access to emotion regulation strategies’ may be most closely related to NSSI, compared to other emotion regulation factors. As previous authors have suggested that longer-term distress may result from pervasive failures to acknowledge, understand and accept emotions (Hayes, Wilson, Gifford, Follette, &
Strosahl, 1996) and engage in value-driven or goal-directed behaviours (Hayes, Strosahl, & Wilson, 1999), and as NSSI may be more distally related to trait impulsivity (Evans, Platts, & Liebanau, 1996; Herpertz, Sass, & Favazza, 1997), it was posited that the relationships between these concepts and NSSI may be mediated by perceived access to coping strategies. Theoretically, failure to acknowledge and understand emotions, difficulties engaging in goal directed behaviours, and general lack of impulse control may render an individual more distressed in the long-term, which may lead to a sense that individuals have few options for coping with negative emotions. With this in mind, a fourth hypothesis was developed:

H4: The STRATEGIES factor of emotion regulation will partially mediate the relationships between NSSI and GOALS, IMPULSE, AWARENESS, CLARITY, and NONACCEPTANCE (see Figure 3 below).

![Figure 3](image-url)  
*Figure 3. Hypothesised pathways between facets of emotion dysregulation and NSSI.*
Finally, existing theory and research around attachment and emotion regulation lend support for a fifth hypothesis. As explicated in Chapter 3, the relationship between NSSI and attachment-related anxiety and avoidance has been explained theoretically in terms of affect regulation. Authors such as Linehan (1993a) discuss that NSSI behaviours may be developed and maintained due to a pervasive difficulty managing distress, which has originated as a result of childhood events, and researchers propose that the link between NSSI and insecure attachment can be explained with reference to difficulties effectively managing or coping with unpleasant emotions (Gormley & McNiel, 2010; Hallab & Covic, 2010; Kimball & Diddams, 2007). With this in mind, a final hypothesis was made:

H5: Emotion regulation will mediate the relationship between attachment-related variables and NSSI (see Figure 4 below).

Figure 4. Hypothesised pathways between attachment, emotion regulation, and NSSI.
5.3 Method

5.3.1 Participants

A total of 545 individuals participated in Study 1, including 66 men and 479 women. Participants were aged between 15 and 79 (\(M = 24.90; SD = 7.89\)). Respondents were recruited via advertisements posted on various websites, including general mental health and NSSI support pages, discussion forums, social media interest groups, and general psychological research sites. Participation was anonymous.

5.3.2 Measures

To achieve the aims of the study, an online questionnaire was developed. The survey included items pertaining to basic demographic information, as well as measures of attachment in specific relationships, emotion regulation skills, alexithymia, and NSSI history.

5.3.2.1 Demographic items.

Firstly, participants were required to complete a demographics sheet comprising various items, including gender, date of birth, marital status, country of birth, current location, Aboriginal and Torres Strait Islander status, and level of education.

5.3.2.2 Attachment.

Attachment in specific relationships was measured through the Experiences in Close Relationships – Relationship Structures Questionnaire (ECR-RS; Fraley, Heffernan, Vicary, & Brumbaugh, 2011). The ECR-RS consists of 36 items in total, and allows measurement of two dimensions of attachment – attachment-related anxiety and attachment-related avoidance – across four close relationships, including
mother (or mother-like figure), father (or father-like figure), romantic partner, and
best friend. It also provides a score of general or global attachment-related anxiety
and avoidance. Items such as ‘It helps to talk to this person in times of need’ and ‘I
find it easy to depend on this person’ are responded to on a seven-point Likert scale,
with 1 indicating ‘strongly disagree’ and 7 indicating ‘strongly agree’. Higher scores
indicate higher levels of attachment-related anxiety or avoidance. The questionnaire
was developed and validated using a large sample of 21,838 respondents recruited
online with a mean age of 31.3 years (SD = 11.28) (Fraley, Vicary, Brumbaugh, &
Roisman, 2011). The measure has demonstrated high internal consistency, with
Cronbach's alpha coefficients ranging from .85 to .92 for each subscale (Fraley,
Heffernan, Vicary, & Brumbaugh, 2011). Test-retest reliability of the individual
scales of the ECR-RS is approximately .80 for the domain of parental relationships,
and .65 for the romantic relationships domain across a 30-day period (Fraley, Vicary,
Brumbaugh, & Roisman, 2011). The test-retest reliability for the best friend domain
of the ECR-RS has not been reported previously. Research demonstrates that the
ECR-RS scales have good convergent and concurrent validity, and have been shown
to be meaningfully related to various relational and interpersonal outcomes (Fraley et
al., 2011). The current study found very good internal consistency for each of the 10
scales of the ECR-RS, with Cronbach’s alphas ranging from .88 - .93, as shown in
Table 1 below.
Table 1

*Internal Consistency Reliability of ECR-RS Subscales*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Cronbach’s Alpha</th>
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<tr>
<td><strong>Anxiety</strong></td>
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<tr>
<td>1. Mother</td>
<td>.90</td>
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<td>2. Father</td>
<td>.90</td>
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<tr>
<td>3. Romantic Partner</td>
<td>.93</td>
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<tr>
<td>4. Best Friend</td>
<td>.93</td>
</tr>
<tr>
<td>5. Global</td>
<td>.88</td>
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<tr>
<td><strong>Avoidance</strong></td>
<td></td>
</tr>
<tr>
<td>1. Mother</td>
<td>.93</td>
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<tr>
<td>2. Father</td>
<td>.90</td>
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<tr>
<td>3. Romantic Partner</td>
<td>.92</td>
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<tr>
<td>4. Best Friend</td>
<td>.92</td>
</tr>
<tr>
<td>5. Global</td>
<td>.92</td>
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</tbody>
</table>

### 5.3.2.3 Emotion regulation.

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) was employed to assess various aspects of emotion dysregulation in participants. This scale is made up of 36 items in total, which are responded to on a five-point Likert scale (where 1 = ‘almost never’, 2 = ‘sometimes’, 3 = ‘about half the time’, 4 = ‘most of the time’, and 5 = ‘almost always’). Items include statements such as ‘I am clear about my feelings’, ‘I am confused about how I feel’, and ‘When I’m upset, I have difficulty controlling my behaviors’. The DERS measure provides a total score reflecting overall emotion dysregulation, as well as scores for six individual scales derived through factor analysis – NONACCEPTANCE, GOALS, IMPULSE, AWARENESS, STRATEGIES, and CLARITY. The first factor, nonacceptance of emotional responses (NONACCEPTANCE) relates to the degree to which an individual reports a tendency to experience negative secondary emotions in response
to distress. The second factor, difficulties engaging in goal directed behavior (GOALS), reflects problems in concentrating or completing tasks while experiencing negative emotions. The third factor, impulse control difficulties (IMPULSE), relates to difficulties maintaining a degree of control of one’s behavior when experiencing distress or negative emotions. The fourth factor, lack of emotional awareness (Awareness), contains items relating to one’s tendency to acknowledge and attend to feelings and emotions. The fifth factor – limited access to emotion regulation strategies (Strategies) – refers to the respondent’s belief that they have few strategies that can be implemented to regulate negative emotions effectively. Finally, the sixth factor, lack of emotional clarity (Clarity), reflects the extent of knowledge one has about the emotions they experience. Higher scores indicate greater emotion dysregulation and/or greater difficulties in the individual areas of emotion regulation reflected in the subscales. Gratz and Roemer (2004) report that the DERS has high internal consistency as a global measure of emotion dysregulation ($\alpha = .93$), as well as for each subscale ($\alpha > .80$), and has demonstrated good test–retest reliability over a period ranging from four to eight weeks ($r = .88, p < .01$; Gratz & Roemer, 2004). The authors also report that the DERS demonstrates good convergent validity, with global and subscale scores significantly correlating with the scores on the Negative Mood Regulation Scale (NMR; Catanzaro & Mearns, 1990), a commonly used measure of emotion regulation. DERS scores are also shown to significantly correlate with mental health and interpersonal outcomes, such as intimate partner abuse (Gratz & Roemer, 2004). The current study found very good internal consistency for the overall measure ($\alpha = .96$). Internal consistency for the individual subscales was also good for the current sample, with Cronbach’s alpha coefficients of
.92 for NONACCEPTANCE, .90 for GOALS, .92 for IMPULSE, .85 for AWARE, .93 for STRATEGIES, and .90 for CLARITY.

5.3.2.3 Alexithymia.

The ability of respondents to identify and describe their emotions and their tendency to focus attention externally and minimise emotional experience (alexithymia) was assessed using the Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994). The TAS-20 is comprised of 20 self-report items responded to on a five-point scale (where 1 = ‘strongly disagree’ and 5 = ‘strongly agree’), with higher scores indicating higher levels of alexithymia. Items include statements such as ‘It is difficult for me to find the right words for my feelings’ and ‘I often don’t know why I am angry’. The TAS-20 provides researchers with a total score for alexithymia, as well as scores for three subscales, including (1) Difficulty Identifying Feelings, (2) Difficulty Describing Feelings and (3) Externally-Orientated Thinking. For the purposes of the current research only the global score for alexithymia was used. Research by Bagby and his colleagues (1994) demonstrated that the TAS-20 shows acceptable internal consistency across clinical and non-clinical samples ($\alpha > .80$.) and adequate test-retest reliability with a student sample over a period of 3 weeks ($r = .77$, $p < .01$). On observing relationships between TAS-20 scores with established measures of personality and emotional processing, Bagby, Taylor and Parker (1994) reported that the TAS-20 has demonstrated good convergent and concurrent validity, as well as adequate discriminant validity. The current study found good internal consistency reliability for the overall measure of alexithymia ($\alpha = .88$).

5.3.2.5 Non-suicidal self-injury.

Lastly, participants’ past history of NSSI was assessed using the Deliberate Self-Harm Inventory (DSHI; Gratz, 2001). The DSHI is a self-report questionnaire
made up of two sections (Part A and Part B), designed to measure the presence and frequency of various NSSI behaviours. Part A contains one dichotomous (Yes/No) item which asks ‘Have you ever intentionally (i.e. on purpose) hurt yourself without intending to kill yourself?’ Only respondents who answer positively to Part A are required to complete Part B, which contains items pertaining to 17 specific forms of NSSI. Respondents were asked whether they had ever engaged in each individual type of NSSI behaviour, and (if they responded positively) how old they were when they first did it, how many times they had done it since, and when the last time they did it was. Previous findings by Gratz (2001) indicate that the DSHI has acceptable internal consistency (α = .82) and test-retest reliability over a period ranging from 2 to 4 weeks (r = .68, p < .001). Fliege et al. (2006) have reported similar results for the reliability of the measure. Gratz (2001) reported good convergent and construct validity, finding that the DSHI correlated significantly with existing dichotomous scales of NSSI, as well as measures such as the Borderline Personality Organization Scale (BPO; Oldham et al., 1985). The current study found good internal consistency for the DSHI (α = .89).

5.3.3 Procedure

Ethics approval from the Deakin University Human Research Ethics Committee (DUHREC) was obtained prior to commencement of the study (see Appendix A). At the recruitment stage, online advertisements for the study directed interested individuals to a webpage where they were provided with a Plain Language Statement (see Appendix B) outlining details such as the study’s purpose and background, and precisely what participation would involve. Those willing to participate were then required to provide anonymous consent by selecting an ‘I agree’
option to the content of the Plain Language Statement. Respondents were then directed to a second webpage containing the questionnaire. It was estimated that the questionnaire could be completed in approximately 15 minutes.

5.3.4 Data Analytic Strategy

In order to test the first three hypotheses (H1, H2, and H3) point biserial correlations and a direct logistic regression were performed. The rationale for the use of these statistical techniques related to the fact that the outcome variable pertaining to NSSI history was dichotomous, indicating that linear regression was inappropriate. These analyses were performed in SPSS Statistics version 21.0 (IBM Corp, 2012). Following this, two path analyses were conducted to test the remaining hypotheses (H4 and H5). Both path analyses were tested in MPlus version 6.12 (Muthén & Muthén, 1998-2010). Given that the same binary outcome variable was used in these analyses, the procedure utilized weighted least square parameter estimates (WLMSV specifically), as suggested by Muthén and Muthén (1998-2010).

5.4 Results

5.4.1 Data cleaning and preparation

Prior to conducting the main analyses, a series of data cleaning processes were undertaken. Efforts were made to ensure that assumptions underlying the statistical procedures proposed for the study were upheld, and to maximise the data available for the study without compromising its integrity. The data was cleaned in accordance with processes suggested by Tabachnick and Fidell (2007) prior to completing logistic regression and path analysis procedures. Data screening was conducted to identify and
manage missing data, outliers, multicollinearity, normality, linearity, and linearity of the logit. These procedures are described below.

5.4.1.1 Missing data.

At the commencement of data cleaning a total of six cases were removed, as each had a substantial amount of data missing (more than 50 percent). Visual inspection revealed that only the initial items of the questionnaire had been completed by these respondents, indicating that missingness was likely due to the effect of fatigue or boredom, or as a result of the order of the items. Following this, procedures to examine and manage missing data were conducted separately for each group (NSSI and Non-NSSI).

Analysis revealed that no items were found to have more than 5% missing data (highest value for the NSSI group was 2.4%; highest value for the Non-NSSI group was 4.2%). Little’s Missing Completely At Random (MCAR) test was found to be statistically nonsignificant for the Non-NSSI group ($\chi^2 = 2242.99$, $df = 2292$, $p = .764$), meaning that it could be inferred that data was missing completely at random. Little’s MCAR test for the NSSI group was significant ($\chi^2 = 8693.16$, $df = 8165$, $p = .000$), indicating that data was not missing completely at random. Inspection of data in the NSSI group, however, revealed that missing data were randomly spread and there did not appear to be any patterns, and thus the data was considered to be missing at random. Given that less than 5% of data was missing and there was no apparent pattern to the missingness, expectation maximization (EM) was utilized to impute missing values, as suggested by Tabachnick & Fidell (2007).

5.4.1.2 Outliers.

Data from each group were screened for univariate and multivariate outliers that may have distorted findings. Univariate outliers were assessed through the
examination of standardised scores (z-scores), where variables with scores in excess of 3.29 ($p < .001$, two-tailed) were considered potential outliers (Tabachnick & Fidell, 2007). In total, ten univariate outliers were detected in the Non-NSSI group. These scores were transformed with a commonly used winsorizing method, involving data points at the tail ends of a distribution being modified to the next highest or lowest value within the distribution (Tabachnick & Fidell, 2007). No univariate outliers were detected in the NSSI group. Multivariate outliers were measured using Mahalanobis distance (Barnett & Lewis, 1994). Three multivariate outliers were identified in the Non-NSSI group. These cases were removed, and a second iteration revealed no new multivariate outliers. No multivariate outliers were detected in the NSSI group.

5.4.1.3 Normality.

As path analysis assumes that continuous variables are normally distributed, it was important to assess for problematic skewness and kurtosis. Although there are statistical tests that can be performed to measure normality, including obtaining the z-scores for skew and kurtosis values, and utilizing the Kolmogorov-Smirnov test, these particular procedures are highly sensitive to sample size and therefore are not appropriate for large data sets like the current one (Tabachnick & Fidell, 2007). West, Finch, and Curran (1995) recommend that violation of normality is of concern if skewness values are greater than two and kurtosis values are greater than seven. Inspection of these values for the current data set revealed that the aforementioned criteria were upheld, indicating that normality was not violated. Inspection of histograms also demonstrated that all continuous variables appeared to be normally distributed.
5.4.1.4 Multicollinearity.

Both logistic regression and path analysis procedures are sensitive to high correlations among predictor variables, and so assume that multicollinearity is absent. As such, a series of tests were conducted to detect high intercorrelations among predictor variables and collinearity problems. This involved examining Pearson correlation coefficients, Variance Inflation Factor (VIF) and Tollerance scores, as well as inspection of collinearity statistics. Table 3 below displays the correlation matrix for all of the continuous variables in the current study. Although no two variables had a Pearson’s correlation value of .90 or above, which would automatically indicate multicollinearity (Tabachnick & Fidell, 2007), Alexithymia and the CLARITY (‘lack of emotional clarity’) factor of the DERS correlated very highly ($r = .83$). While VIF and Tollerance values did not appear extreme upon inspection (when cut-off scores suggested by Myers (1990) and Menard (1995) were utilized), collinearity diagnostics indicated a problem. A conditioning index of 37.61 was revealed, coupled with variance proportions of .94 for Alexithymia and .53 for CLARITY on this dimension, suggesting that these variables were measuring very similar, if not nearly identical, constructs. Given that the inclusion of redundant variables is unnecessary, and may inflate error terms and weaken an analysis (Tabachnick & Fidell, 2007), it was determined that one variable should be omitted. In order to retain all of the emotion regulation factors measured by the DERS, Alexithymia was removed from the logistic regression analysis.
Table 2

Pearson correlation coefficients between continuous independent variables

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</tr>
</tbody>
</table>

Note. 1 = Attachment Avoidance with Mother (ECR-RS), 2 = Attachment Anxiety with Mother (ECR-RS), 3 = Attachment Avoidance with Father (ECR-RS), 4 = Attachment Anxiety with Father (ECR-RS), 5 = Attachment Avoidance with Romantic Partner (ECR-RS), 6 = Attachment Anxiety with Romantic Partner (ECR-RS), 7 = Attachment Avoidance with Best Friend (ECR-RS), 8 = Attachment Anxiety with Best Friend (ECR-RS), 9 = Alexithymia (TAS-20), 10 = NONACCEPTANCE (DERS), 11 = GOALS (DERS), 12 = IMPULSE (DERS), 13 = AWARE (DERS), 14 = STRATEGIES (DERS), 15 = CLARITY (DERS)

5.4.1.5 Linearity.

As path analysis assumes linearity, scatterplots were examined to assess for linear relationships among pairs of measured variables (Tabachnick & Fidell, 2007). Upon visual inspection, no violations were detected. As logistic regression assumes that there is a linear relationship between the continuous predictors and the logit transformation of the outcome variable, the Box-Tidwell approach was utilized (Hosmer & Lemeshow, 2000). The result obtain from this analysis revealed that 13 out of 14 interaction terms tested had a significance value greater than .05, indicating that the linearity of the logit assumption was upheld for all of these variables. The interaction between AWARE and it’s logarithm, however, was statistically significant ($p = .04$). This indicated a minor departure from the assumption of linearity of the logit for this particular variable. Although transformation of this predictor could have
been undertaken to solve the violation, this was not undertaken in the current case, as it did not appear a serious violation and as transformation procedures are said to have distinct disadvantages and are not a universally recommended practice (Tabachnick & Fidell, 2007).

5.4.2 Descriptive statistics

5.4.2.1 Prevalence of non-suicidal self-injury.

Of the 545 participants in the current study, 83.12 percent \( (n = 453) \) reported a history of NSSI and so were placed in the NSSI group. The remaining 16.88 percent \( (n = 92) \) stated that they had never engaged in NSSI behaviours and so were placed in the Non-NSSI group.

Individuals in the NSSI group had a mean age of 25 and were mostly female (90.73%). It was very common for these respondents to report having engaged in multiple forms of NSSI. The number of methods endorsed ranged between one and 14, with participants on average reporting a history of 4.39 different behaviours. Table 3 displays the frequency and percentage of each type of NSSI behaviour measured. As shown here, the most common method of NSSI was cutting of the wrists, arms or other areas of the body, with 88.5 percent of respondents reporting this.

Participants varied in their reports of the age they first engaged in NSSI behaviours. The youngest reported age was seven, and the oldest was 53. Table 4 below displays the average age of first use for each of the 17 NSSI behaviours recorded by the DSHI. It can be seen here that participants generally reported that they first engaged in NSSI behaviours during adolescence. In terms of recency, 69.98 percent \( (n = 317) \) of respondents in the NSSI group reported that they had engaged in one or more NSSI behaviour within 12 months prior to completion of the
questionnaire. Approximately 42.6 percent \((n = 193)\) reported that they had engaged in NSSI within the previous month. A total of 24.77 percent of respondents \((n = 135)\) reported that their NSSI behaviours had been severe enough to require them to seek medical attention.

**Table 3**

*Frequency of Individuals in NSSI Group Endorsing Each NSSI Behaviour*

<table>
<thead>
<tr>
<th>NSSI Behaviour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting</td>
<td>401</td>
<td>88.5</td>
</tr>
<tr>
<td>Burning with cigarette</td>
<td>68</td>
<td>15</td>
</tr>
<tr>
<td>Burning with lighter or match</td>
<td>134</td>
<td>29.6</td>
</tr>
<tr>
<td>Carving words into skin</td>
<td>189</td>
<td>41.7</td>
</tr>
<tr>
<td>Carving pictures into skin</td>
<td>107</td>
<td>23.6</td>
</tr>
<tr>
<td>Severe scratching</td>
<td>258</td>
<td>57</td>
</tr>
<tr>
<td>Biting</td>
<td>69</td>
<td>15.2</td>
</tr>
<tr>
<td>Rubbing sandpaper on skin</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>Dripping acid on skin</td>
<td>5</td>
<td>1.1</td>
</tr>
<tr>
<td>Scrubbing skin with cleaning product</td>
<td>10</td>
<td>2.2</td>
</tr>
<tr>
<td>Sticking sharp objects into skin</td>
<td>149</td>
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</tr>
<tr>
<td>Rubbing glass into skin</td>
<td>40</td>
<td>8.8</td>
</tr>
<tr>
<td>Breaking bones</td>
<td>10</td>
<td>2.2</td>
</tr>
<tr>
<td>Banging head</td>
<td>87</td>
<td>19.2</td>
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<tr>
<td>Punching self</td>
<td>147</td>
<td>32.5</td>
</tr>
<tr>
<td>Preventing wounds from healing</td>
<td>170</td>
<td>37.5</td>
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<tr>
<td>Other forms of non-suicidal self-injury</td>
<td>142</td>
<td>31.3</td>
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</table>
Table 4

*Average Age of First use of NSSI Methods*

<table>
<thead>
<tr>
<th>NSSI Behaviour</th>
<th>Mean Age</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting</td>
<td>14.86</td>
<td>3.94</td>
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<tr>
<td>Burning with cigarette</td>
<td>17.41</td>
<td>3.47</td>
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<tr>
<td>Burning with lighter or match</td>
<td>16.07</td>
<td>3.01</td>
</tr>
<tr>
<td>Carving words into skin</td>
<td>15.78</td>
<td>4.19</td>
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<tr>
<td>Carving pictures into skin</td>
<td>16.05</td>
<td>5.50</td>
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<tr>
<td>Severe scratching</td>
<td>15.57</td>
<td>5.20</td>
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<tr>
<td>Biting</td>
<td>14.32</td>
<td>4.22</td>
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<tr>
<td>Rubbing sandpaper on skin</td>
<td>16.39</td>
<td>3.91</td>
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<tr>
<td>Dripping acid on skin</td>
<td>17.40</td>
<td>4.28</td>
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<tr>
<td>Scrubbing skin with cleaning product</td>
<td>19.30</td>
<td>5.27</td>
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<td>Sticking sharp objects into skin</td>
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<tr>
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<td>Banging head</td>
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<td>16.99</td>
<td>6.13</td>
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5.4.2.2 Attachment, alexithymia and emotion dysregulation.

The means, standard deviations and possible ranges for each of the measures in the current study are displayed in Table 5 below. Compared to those in the Non-NSSI group, respondents in the NSSI group reported significantly higher levels of Attachment Anxiety and Avoidance across all relationships, as well as on the global scores for these constructs. Participants in the NSSI group also reported significantly higher levels of Alexithymia, as well as significantly greater difficulties regulating emotions across all subscales of the DERS.
Table 5

**Descriptive Statistics for Attachment, Alexithymia and Emotion Regulation**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Possible Range</th>
<th>P-Value</th>
<th>Effect size (Cohen’s d)</th>
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<td>Romantic Partner NSSI</td>
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<td>NONACCEPTANCE NSSI</td>
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<td>1 – 5</td>
<td>.000</td>
<td>1.05</td>
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<tr>
<td>Non-NSSI</td>
<td>2.33</td>
<td>1.08</td>
<td>1 – 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOALS NSSI</td>
<td>3.27</td>
<td>1.00</td>
<td>1 – 5</td>
<td>.000</td>
<td>0.35</td>
</tr>
<tr>
<td>Non-NSSI</td>
<td>2.92</td>
<td>1.01</td>
<td>1 – 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMPULSE NSSI</td>
<td>3.03</td>
<td>1.06</td>
<td>1 – 5</td>
<td>.000</td>
<td>1.01</td>
</tr>
<tr>
<td>Non-NSSI</td>
<td>2.03</td>
<td>0.91</td>
<td>1 – 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLARITY NSSI</td>
<td>3.23</td>
<td>0.98</td>
<td>1 – 5</td>
<td>.000</td>
<td>1.05</td>
</tr>
<tr>
<td>Non-NSSI</td>
<td>2.25</td>
<td>0.89</td>
<td>1 – 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AWARE NSSI</td>
<td>3.05</td>
<td>0.95</td>
<td>1 – 5</td>
<td>.000</td>
<td>0.77</td>
</tr>
<tr>
<td>Non-NSSI</td>
<td>2.40</td>
<td>0.72</td>
<td>1 – 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STRATEGIES NSSI</td>
<td>3.51</td>
<td>1.00</td>
<td>1 – 5</td>
<td>.000</td>
<td>1.36</td>
</tr>
<tr>
<td>Non-NSSI</td>
<td>2.16</td>
<td>0.98</td>
<td>1 – 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion Regulation NSSI</td>
<td>3.33</td>
<td>7.25</td>
<td>1 – 5</td>
<td>.000</td>
<td>0.19</td>
</tr>
<tr>
<td>Non-NSSI</td>
<td>2.35</td>
<td>0.72</td>
<td>1 – 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5.4.3 Hypothesis 1: Point Biserial Correlations

In order to determine the zero-order relationship between the dichotomous grouping variable (NSSI, Non-NSSI) and the continuous predictors in the study, point
biserial correlation coefficients were calculated. These findings are displayed in Table 6 below. It can be seen here that there was a significant correlation (at the $p < .001$ level) between the NSSI grouping variable and all of the 18 continuous variables included in the analysis. The strength of these correlations ranged from weak to moderate. All relationships were positive in direction, indicating that individuals in the NSSI group on average reported higher levels of emotion dysregulation, alexithymia, and attachment-related avoidance and anxiety compared to those in the Non-NSSI group.

Comparing all of the variables included in the analysis, the strongest point biserial correlation was found between the Global Emotion Dysregulation variable and the NSSI grouping variable ($r_{pb} = .46$). This moderate positive relationship suggests that as emotion dysregulation increased, participants were more likely to report a history of NSSI. Focusing on the emotion regulation subscales, it can be seen that the NSSI grouping variable was most strongly correlated with STRATEGIES ($r_{pb} = .45$). This moderate positive relationship reveals that respondents with a history of NSSI were more likely than those without a history of NSSI to report limited access to emotion regulation strategies.

Focusing on the attachment-related variables in the analysis, Table 6 shows that the Global Attachment Avoidance variable was most strongly correlated with NSSI ($r_{pb} = .43$). This moderate positive correlation indicates that respondents with a history of NSSI on average reported higher levels of attachment-related avoidance across all relationship domains compared to those without a history of NSSI. Global Attachment Anxiety was also positively correlated with NSSI ($r_{pb} = .40$), indicating that as attachment-related anxiety increased, so did the likelihood that respondents would report a history of NSSI. Regarding the attachment subscales, the NSSI
grouping variable correlated most strongly with Attachment Avoidance with Father ($r_{pb} = .38$). This moderate positive relationship suggests that as Attachment Avoidance with Father increased, the likelihood that someone would report a history of NSSI also increased. Finally, there was also a moderate positive point biserial correlation between NSSI and Alexithymia ($r_{pb} = .37$), indicating that respondents in the NSSI group were more likely than those in the Non-NSSI group to report higher levels of Alexithymia.

Table 6

*Correlations Between Predictor Variables and NSSI Grouping Variable*

<table>
<thead>
<tr>
<th>Continuous Variables</th>
<th>Zero-Order Correlation with NSSI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attachment Avoidance (ECR-RS)</strong></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>.34**</td>
</tr>
<tr>
<td>Father</td>
<td>.38**</td>
</tr>
<tr>
<td>Romantic Partner</td>
<td>.22**</td>
</tr>
<tr>
<td>Best Friend</td>
<td>.24**</td>
</tr>
<tr>
<td>Global Avoidance</td>
<td>.43**</td>
</tr>
<tr>
<td><strong>Attachment Anxiety (ECR-RS)</strong></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>.26**</td>
</tr>
<tr>
<td>Father</td>
<td>.30**</td>
</tr>
<tr>
<td>Romantic Partner</td>
<td>.30**</td>
</tr>
<tr>
<td>Best Friend</td>
<td>.29**</td>
</tr>
<tr>
<td>Global Anxiety</td>
<td>.40**</td>
</tr>
<tr>
<td><strong>Alexithymia (TAS-20)</strong></td>
<td>.37**</td>
</tr>
<tr>
<td><strong>Emotion regulation (DERS)</strong></td>
<td></td>
</tr>
<tr>
<td>NONACCEPTANCE</td>
<td>.37**</td>
</tr>
<tr>
<td>GOALS</td>
<td>.28**</td>
</tr>
<tr>
<td>IMPULSE</td>
<td>.34**</td>
</tr>
<tr>
<td>AWARE</td>
<td>.26**</td>
</tr>
<tr>
<td>STRATEGIES</td>
<td>.45**</td>
</tr>
<tr>
<td>CLARITY</td>
<td>.36**</td>
</tr>
<tr>
<td>Global Emotion Dysregulation</td>
<td>.46**</td>
</tr>
</tbody>
</table>

** $p < .001$ (2-tailed).
5.4.4 Hypothesis 2 and 3: Direct Logistic Regression

Direct logistic regression was performed to assess the impact of a number of factors on the likelihood that respondents would report a history of NSSI. The model contained 13 independent variables, including eight factors of attachment (Attachment Avoidance with Mother, Attachment Avoidance with Father, Attachment Avoidance with Romantic Partner, Attachment Avoidance with Best Friend, Attachment Anxiety with Mother, Attachment Anxiety with Father, Attachment Anxiety with Romantic Partner, and Attachment Anxiety with Best Friend) and six factors of emotion regulation (NONACCEPTANCE, GOALS, IMPULSE, AWARE, STRATEGIES, and CLARITY). As discussed in the Data Cleaning subsection, the Alexithymia variable was not included in the analysis due to collinearity problems.

The full model containing all predictors was statistically significant, $\chi^2 (14, N = 545) = 186.86, p < .001$ indicating that the model was able to distinguish between respondents who did and did not report a history of NSSI. The Hosmer and Lemeshow Goodness of Fit Test was statistically nonsignificant, $\chi^2 (8, N = 545) = 5.94, p = .65$, suggesting that the model had adequate fit to the data.

Results revealed a value of .29 for the Cox and Snell R Square and .49 for the Nagelkerke R Square. This indicated that as a whole the model explained between 29 and 49 percent of the variance in the NSSI grouping variable. As these statistics are not always reliable, however, and can be biased by sample size, R Square estimates were also calculated by hand, by dividing the model chi-square value by the log-likelihood of the initial model (the null model). This revealed an R Square value of .38, indicating that the model explained approximately 38 percent of the variance in the NSSI grouping variable.
Table 7 below reports the b coefficients and standardised odds ratios for the variables, as well as the statistical significance of each independent variable in contributing to the predictive ability of the model. As is shown here, when all independent variables were included, there were only three that made a unique statistically significant contribution to the model’s ability to predict group membership (NSSI versus Non-NSSI). These were Attachment Anxiety with Father, Attachment Anxiety with Romantic Partner, and STRATEGIES. Results revealed that the remaining 11 variables (Attachment Avoidance with Mother, Attachment Avoidance with Father, Attachment Avoidance with Romantic Partner, Attachment Avoidance with Friend, Attachment Anxiety with Mother, Attachment Anxiety with Friend, NONACCEPTANCE, GOALS, IMPULSE, AWARE, CLARITY) did not make a unique statistically significant contribution to the predictive ability of the model.

In relation to the second hypothesis, the results of the logistic regression support the notion that attachment-related variables would be differentially important in predicting NSSI. As shown in the table above, the strongest predictor of reporting a history of NSSI was Attachment Anxiety with Father, recording an odds ratio of 1.44. This indicated that when Attachment Anxiety with Father increased by one unit, the likelihood that an individual would report a history of NSSI also increased by a factor of approximately 1.45 times, controlling for all other factors in the model. Attachment Anxiety with Romantic Partner was also found to be a unique statistically significant predictor of NSSI group membership. Findings revealed that when Attachment Anxiety with Romantic Partners increased by one unit, respondents became approximately 1.20 times more likely to have engaged in NSSI behaviours, controlling for all other factors in the model.
Table 7

**Statistical Significance, B Values and Odds Ratios for Predictors**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Significance Value (Wald Test)</th>
<th>B Coefficients</th>
<th>Standardised Odds Ratio (95% confidence intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment Avoidance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>0.05</td>
<td>0.01</td>
<td>1.22 (1.00-1.47)</td>
</tr>
<tr>
<td>Father</td>
<td>0.05</td>
<td>0.23</td>
<td>1.25 (1.00-1.57)</td>
</tr>
<tr>
<td>Romantic Partner</td>
<td>0.63</td>
<td>0.06</td>
<td>1.06 (0.81-1.39)</td>
</tr>
<tr>
<td>Best Friend</td>
<td>0.51</td>
<td>0.09</td>
<td>1.09 (0.84-1.41)</td>
</tr>
<tr>
<td>Attachment Anxiety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>0.94</td>
<td>0.01</td>
<td>1.01 (0.78-1.32)</td>
</tr>
<tr>
<td>Father</td>
<td>0.01</td>
<td>0.37</td>
<td>1.44 (1.09-1.91)</td>
</tr>
<tr>
<td>Romantic Partner</td>
<td>0.04</td>
<td>0.18</td>
<td>1.20 (1.01-1.44)</td>
</tr>
<tr>
<td>Best Friend</td>
<td>0.35</td>
<td>0.12</td>
<td>1.11 (0.89-1.38)</td>
</tr>
<tr>
<td>Emotion Regulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NONACCEPTANCE</td>
<td>0.73</td>
<td>0.01</td>
<td>1.01 (0.95-1.07)</td>
</tr>
<tr>
<td>GOALS</td>
<td>0.55</td>
<td>0.02</td>
<td>1.02 (0.95-1.10)</td>
</tr>
<tr>
<td>IMPULSE</td>
<td>0.49</td>
<td>-0.03</td>
<td>0.97 (0.90-1.05)</td>
</tr>
<tr>
<td>AWARE</td>
<td>0.33</td>
<td>0.04</td>
<td>1.04 (0.96-1.12)</td>
</tr>
<tr>
<td>STRATEGIES</td>
<td>0.00</td>
<td>0.12</td>
<td>1.11 (1.04-1.19)</td>
</tr>
<tr>
<td>CLARITY</td>
<td>0.82</td>
<td>-0.01</td>
<td>0.99 (0.90-1.08)</td>
</tr>
</tbody>
</table>

Consistent with the third hypothesis, not all emotion regulation variables had the same ability to predict NSSI grouping. Only the STRATEGIES component of emotion regulation was found to make a unique statistically significant contribution to the predictive ability of the model. That is, findings suggested that the odds of reporting past engagement in NSSI behaviours was approximately 1.11 times higher for an individual with limited access to emotion regulation strategies, controlling for all other factors in the model. As all emotion regulation factors were shown to have significant zero-order correlations with NSSI, this particular finding supports the notion that these relationships may be mediated by STRATEGIES (as originally hypothesised).

Table 8 below shows the percentage of correctly classified cases in the model. This demonstrates that the model as a whole correctly classified 87.7 percent of cases.
(the percentage accuracy in classification). The sensitivity of the model, reflected by the number of true positives, was 95.4 percent. The specificity of the model, represented by the number of true negatives, was 50 percent. The positive predictive value was 90.37 percent and the negative predictive value was 31.34 percent. These statistics reveal that the model demonstrated strength in its ability to correctly classify individuals in the NSSI group, but was less accurate when it came to categorising those in the Non-NSSI group.

Table 8

*Classification of Variables in the Model*

<table>
<thead>
<tr>
<th>Predicted Group membership</th>
<th>Observed Group membership</th>
<th>Non-NSSI</th>
<th>NSSI</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-NSSI</td>
<td>46</td>
<td>46</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>NSSI</td>
<td>21</td>
<td>432</td>
<td></td>
<td>95.4</td>
</tr>
<tr>
<td>Overall percentage</td>
<td></td>
<td></td>
<td></td>
<td>87.7</td>
</tr>
</tbody>
</table>

**5.4.5 Hypothesis 4: Path Analysis I**

Path analysis was utilized to determine whether the STRATEGIES subscale of emotion regulation would mediate the relationship between the remaining facets of emotion regulation (including GOALS, IMPULSE, AWARENESS, CLARITY, and NONACCEPTANCE) and the NSSI grouping variable. The hypothesised theoretical model was presented in Figure 2, section 5.2. As previously mentioned, this model was tested in the statistical program MPlus using weighted least means squares estimation (WLSMV specifically). The fit of the model to the data was assessed using the chi-square goodness of fit test, as well as other fit indicators such as the Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). Hu and Bentler (1999) suggested that for categorical outcome data, good fit is indicated by a TLI greater than .95, and CFI greater than .95,
and that an RMSEA of less than .06 indicates a reasonable approximation of error. These cut-offs were utilized during the current analyses.

The parameter estimates and significance values from the structural component of the analysis are displayed in Table 9 below. The indirect effects are shown in Table 10. As can be seen, the direct pathways from NONACCEPTANCE, GOALS, IMPULSE, and CLARITY to NSSI were not found to be statistically significant. These variables were found, however, to be indirectly related to NSSI through STRATEGIES. These findings indicate that the relationship between NSSI and NONACCEPTANCE, GOALS, IMPULSE, and CLARITY was mediated by STRATEGIES. The direct pathway from AWARE to NSSI was statistically significant, as was the indirect pathway through STRATEGIES. This suggests that the relationship between AWARE and NSSI was partially mediated by STRATEGIES. Hypothesis 4 was therefore partially supported.

Table 9

**Model I Results: Unstandardised, Standardised and Significance Values**

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Unstandardised Estimate</th>
<th>SE</th>
<th>Standardised</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONACCEPTANCE to STRATEGIES</td>
<td>.28</td>
<td>.04</td>
<td>.22***</td>
</tr>
<tr>
<td>NONACCEPTANCE to NSSI</td>
<td>.02</td>
<td>.02</td>
<td>.11</td>
</tr>
<tr>
<td>GOALS to STRATEGIES</td>
<td>.50</td>
<td>.05</td>
<td>.29***</td>
</tr>
<tr>
<td>GOALS to NSSI</td>
<td>.00</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td>IMPULSE to STRATEGIES</td>
<td>.44</td>
<td>.05</td>
<td>.32***</td>
</tr>
<tr>
<td>IMPULSE to NSSI</td>
<td>.01</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>CLARITY to STRATEGIES</td>
<td>.44</td>
<td>.05</td>
<td>.26***</td>
</tr>
<tr>
<td>CLARITY to NSSI</td>
<td>.00</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>AWARENESS to STRATEGIES</td>
<td>-.10</td>
<td>.04</td>
<td>-.06*</td>
</tr>
<tr>
<td>AWARENESS to NSSI</td>
<td>.04</td>
<td>.02</td>
<td>.20*</td>
</tr>
<tr>
<td>STRATEGIES to NSSI</td>
<td>.07</td>
<td>.01</td>
<td>.46***</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, ***p < .001
Removing the direct pathways that were not statistically significant, findings from the current theoretical model are displayed in graphical form in Figure 5 below. R Square estimates revealed that the model explained approximately 72.3 percent of the variance in STRATEGIES, and approximately 37.6 percent of the variance in NSSI. Results suggest that the model was a good fit to the data, $\chi^2 (4, N = 545) = 2.04$, $p < .001$, CFI > .99, TLI > .99, RMSEA = 0.00.

Figure 5. Path analysis for the relationship between NSSI and facets of emotion dysregulation.
5.4.6 Hypothesis 5: Path analysis II

A second path analysis was conducted to determine whether emotion regulation would mediate the relationship between attachment-related variables and NSSI. The hypothesised theoretical model was presented in Figure 3, section 5.2. As with the first path analysis, this model was tested in the statistical program MPlus using WLSMV estimation, and model fit was assessed using the chi-square goodness of fit, CFI, TLI and RMSEA. The parameter estimates and significance values from this analysis are displayed in Table 11 below. The indirect effects are shown in Table 12.

Table 11
Model 2 Results: Unstandardised, Standardised and Significance Values

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>Unstandardised Estimates</th>
<th>Standardised Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoidance Mother to Emotion Dysregulation</td>
<td>2.19 0.66</td>
<td>0.13***</td>
</tr>
<tr>
<td>Anxiety Mother to Emotion Dysregulation</td>
<td>1.33 0.76</td>
<td>0.08</td>
</tr>
<tr>
<td>Avoidance Father to Emotion Dysregulation</td>
<td>3.49 0.81</td>
<td>0.18***</td>
</tr>
<tr>
<td>Anxiety Father to Emotion Dysregulation</td>
<td>1.35 0.70</td>
<td>0.09</td>
</tr>
<tr>
<td>Avoidance Romantic Partner to Emotion Dysregulation</td>
<td>1.93 0.78</td>
<td>0.10*</td>
</tr>
<tr>
<td>Anxiety Romantic to Partner Emotion Dysregulation</td>
<td>2.50 0.61</td>
<td>0.17***</td>
</tr>
<tr>
<td>Avoidance Best Friend to Emotion Dysregulation</td>
<td>0.84 0.83</td>
<td>0.04</td>
</tr>
<tr>
<td>Anxiety Best Friend to Emotion Dysregulation</td>
<td>3.56 0.67</td>
<td>0.23***</td>
</tr>
<tr>
<td>Emotion Dysregulation to NSSI</td>
<td>0.02 0.00</td>
<td>0.56***</td>
</tr>
</tbody>
</table>

As shown in Table 11 above, pathways to Emotion Dysregulation from Attachment Avoidance with Mother, Attachment Avoidance with Father, Attachment Avoidance with Partner, Attachment Anxiety with Partner, and Attachment Anxiety with Best Friend, were all statistically significant. Indirect pathways from these variables to the NSSI grouping variable via Emotion Dysregulation were also
statistically significant, as displayed in Table 12. The remaining attachment-related variables (Attachment Anxiety with Mother, Attachment Anxiety with Father, and Attachment Avoidance with Best Friend) did not have statistically significant pathways to emotion regulation. Hypothesis 5, which proposed that emotion regulation would mediate the relationship between attachment and NSSI, was therefore supported for all attachment-related variables except these three.

Table 12
*Indirect Effects from Attachment Variables to NSSI via Emotion Regulation*

<table>
<thead>
<tr>
<th>Indirect Pathway</th>
<th>Estimate</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Avoidance Mother to NSSI</td>
<td>0.04</td>
<td>0.01***</td>
</tr>
<tr>
<td>From Anxiety Mother to NSSI</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>From Avoidance Father to NSSI</td>
<td>0.07</td>
<td>0.02***</td>
</tr>
<tr>
<td>From Anxiety Father to NSSI</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>From Avoidance Romantic Partner to NSSI</td>
<td>0.04</td>
<td>0.02*</td>
</tr>
<tr>
<td>From Anxiety Romantic Partner to NSSI</td>
<td>0.05</td>
<td>0.01***</td>
</tr>
<tr>
<td>From Avoidance Best Friend to NSSI</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>From Anxiety Best Friend to NSSI</td>
<td>0.07</td>
<td>0.02***</td>
</tr>
</tbody>
</table>

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

The model had adequate fit, $\chi^2 (8, N = 545) = 15.89 p < .001$, CFI = 0.93, TLI = 0.96, RMSEA = 0.04. While the CFI value was slightly below Hu & Bentler’s (1999) cut-off of 0.95, as it was still above 0.90 it was considered acceptable. R Square estimates revealed that the model explained approximately 31 percent of the variance in the NSSI grouping variable, and approximately 40.8 percent of the variance in Emotion Dysregulation. Findings from the current model are displayed graphically in Figure 6 below. Dashed lines labelled NS represent pathways that were not found to be statistically significant.
Figure 6. Path analysis with emotion dysregulation as a mediator for the relationship between attachment variables and NSSI.

5.5 Discussion

Existing research suggests that theories of attachment and affect regulation may be used to explain NSSI behaviours in some individuals. As outlined previously, however, findings remain preliminary and there are a number of gaps in the extant empirical literature. Study 1 aimed to examine the associations between NSSI, facets of emotion dysregulation, alexithymia, and specific attachment relationships. Four research questions were posed:

RQ1: How accurately can group membership (NSSI versus non-NSSI) be predicted by measures of attachment in specific relationships, emotion regulation factors, and alexithymia?
RQ2: Which attachment, emotion regulation and alexithymia variables are most important in predicting NSSI?

RQ3: Is the relationship between NSSI and attachment-related variables mediated by difficulties with emotion regulation?

RQ4: What are the pathways between different emotion regulation factors in predicting NSSI?

As discussed in section 5.2, five hypotheses were developed in line with the available theoretical and empirical literature. First, it was hypothesised that there would be a positive zero-order relationship between NSSI, difficulties in emotion regulation, alexithymia, and attachment-related avoidance and anxiety in specific relationships (H1). Second, it was hypothesised that mother, father, peer, and romantic partner attachment-related variables would be differentially important in predicting NSSI (H2). Third, it was hypothesised that emotion regulation factors would be differentially important in predicting NSSI (H3). Fourth, it was hypothesised that the STRATEGIES factor of emotion regulation would partially mediate the relationship between NSSI and GOALS, IMPULSE, AWARENESS, CLARITY, and NONACCEPTANCE (see Figure 2, Section 5.2) (H4). Last, it was hypothesised that emotion regulation would mediate the relationship between attachment-related variables and NSSI (see Figure 3, Section 5.2) (H5).

Cross-sectional survey methodology was used to test the five hypotheses specified above. A total of 545 participants completed an online questionnaire containing basic demographics items and measures of attachment in specific relationships (ECR-RS; Fraley, Heffernan, Vicary, & Brumbaugh, 2011), emotion regulation skills (DERS; Gratz & Roemer, 2004), alexithymia (TAS-20; Bagby,
Parker, & Taylor, 1994), and NSSI behaviours (DSHI; Gratz, 2001). The average age of respondents was approximately 24.9 (SD = 7.89), and the majority of participants were women (87.89%). Data analysis involved conducting point-biserial correlations, a direct logistic regression, and two path analyses.

During the data cleaning and preparation phase, it was revealed that Alexithymia and the CLARITY factor of emotion regulation were very highly correlated. To avoid problems caused by multicollinearity, Alexithymia was removed from the logistic regression analysis. As an aside, this observed multicollinearity underscores the point raised in the Chapter 4 regarding the conceptual overlap between emotion regulation, alexithymia and coping. Evidently, the current study appears to support Gratz and Roemer’s (2008) conceptualisation of alexithymia as a component of emotion regulation, despite the earlier assertion that the distinguishing feature of Taylor, Bagby, and Parker’s (1997) multifaceted definition of alexithymia is the inherent focus on accurately labelling and articulating emotions. Indeed, the lack of clarity surrounding emotion regulation nomenclature has serious implications for theory and research, and thus needs to be addressed.

Of the total sample, 83.12% reported a history of NSSI. Consistent with past literature (Jacobson & Gould, 2007; Laye-Gindhu & Schonert-Reichl, 2005; Muehlenkamp & Gutierrez, 2004; Ross & Heath, 2003; Zoroglu, et al., 2003), cutting of the wrists, arms, or other areas of the body was the most frequently endorsed behaviour. Although the extent of NSSI behaviours differed across participants, most respondents disclosed that they had utilized several methods of NSSI, and almost half (42.6%) had engaged in NSSI in the previous month. While the sample was mostly young adults, participants typically reported that they commenced NSSI in adolescence, which is congruent with findings from previous clinical and community-
based studies (Kumar, Pepe, & Steer, 2004; Muehlenkamp & Gutierrez, 2004; Muehlenkamp & Gutierrez, 2007; Nixon, Cloutier, & Aggarwai, 2002; Nock & Prinstein, 2004; Ross & Heath, 2003). The early onset of NSSI highlights the importance of early intervention in school-aged populations.

Descriptive statistics revealed that 24.77% of participants in the NSSI group had engaged in NSSI severe enough to require they seek medical attention. The finding that, in the vast majority of cases, NSSI was not lethal or medically serious enough to require professional assistance, supports assertions by previous authors (Michelmore, 2012; Rodham & Hawton, 2009) that many NSSI behaviours may not necessarily come to clinical attention. This indicates that statistics based on hospital admissions are likely to grossly underestimate NSSI prevalence, and emphasises the need for intervention at the community level.

Overall, the data provided support for the five hypotheses developed at the onset of the study. There were, however, mixed findings for Hypothesis 4 and Hypothesis 5. Findings associated with each hypothesis are summarised and discussed below in relation to past research and theory. The implications of each finding for clinical practice are also highlighted. Following this, the shortcomings or limitations of the study are discussed. The section closes with suggested directions for future empirical research.

5.5.1 Hypothesis 1

Supporting the first hypothesis, the current study found that there were highly significant positive zero-order relationships between NSSI and difficulties in emotion regulation, alexithymia, and attachment-related avoidance and anxiety in specific relationships. As participants reported an increase in Global Emotion Dysregulation,
as well as increases in the six individual factors of emotion regulation (NONACCEPTANCE, GOALS, IMPULSE, AWARE, STRATEGIES, and CLARITY), the likelihood that they would report a history of NSSI also increased. Of the emotion regulation factors, ‘limited access to emotion regulation strategies’ (STRATEGIES) was most strongly related to NSSI, revealing preliminary support for Hypothesis 3. Findings also revealed that an increase in Alexithymia was associated with an increase in the likelihood that participants would report a history of NSSI. Higher levels of Attachment Avoidance and Attachment Anxiety across all domains (including Mother, Father, Romantic Partner, Best Friend, and Global scores) were associated with significant increases in the likelihood of NSSI behaviours. Global Attachment Avoidance had the strongest relationship with NSSI. Regarding specific relationships, Attachment Avoidance with Father was most strongly associated with NSSI behaviours, demonstrating preliminary support for Hypothesis 2.

Results from the current study support previous findings that NSSI is associated with insecure attachment styles (Gormley & McNiel, 2010; Gratz, Conrad & Roemer, 2002; Hallab & Covic, 2010; Levesque, Lafontaine, Bureau. Cloutier, & Dandurand; 2010; Step et al., 2008). Theoretically, problematic relationships with early caregivers may influence the development of working models that are carried into adolescence and adulthood where they impact upon current relationships, beliefs, and behaviours (Bowlby, 1982, 1988; Collins & Allard, 2003), which may in turn render someone more vulnerable to the development of NSSI and other symptoms of psychopathology (Dozier, Stovall-McClough, & Albus, 2008; Linehan, 1993a; Yates, 2004; van der Kolk, Perry, & Herman, 1996). Although causality cannot be implied, the current study provides support for the notion that high levels of attachment-related
avoidance and anxiety across multiple relationships may place an individual at risk of developing NSSI behaviours.

This study also supports empirical research that suggests that NSSI is associated with poor emotion regulation (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Gratz & Tull, 2010; Heath, Toste, Nedecheva, & Charlebois, 2008; Slee, Garnefski, Spinhoven, & Arensman, 2008) and heightened levels of alexithymia (Evren & Evren, 2005; Garish & Wilson, 2010; Pavio & McCulloch, 2004; Swannell et al., 2012; Zlotnick et al., 1996). This supports authors such as Linehan (1993a) who posit that NSSI reflects an inability to effectively manage stressors. Those high on alexithymia may be more vulnerable to developing NSSI behaviours, as difficulties identifying and describing thoughts, emotions and bodily sensations may limit one’s ability to engage in effective strategies to cope with distress (Taylor, 2004). The fact that all six factors of emotion regulation are correlated with NSSI behaviours indicates that multiple aspects of the emotion regulation process may be impaired in those with a tendency to engage in NSSI.

Overall then, NSSI is associated with problematic attachment within different relationships, as well as a wide range of emotion regulation difficulties. As outlined, these findings confirm and are consistent with other studies in the available literature. These results add to the emerging empirical data demonstrating the importance of attachment in relation to NSSI, which dovetails with the established clinical practice of attending to attachment and relationship issues for individuals affected by psychopathology (i.e. Bowlby, 1988; Brakemeier, & Frase, 2012; Klerman, Weissman, Rounsaville, & Chevron, 1984). Taken together, these results support and add additional weight to the current clinical and therapeutic focus with people who self-injure, with intervention protocols emphasising a reduction in emotion
dysregulation and distress intolerance, and an increase in interpersonal effectiveness and adaptive communication skills (i.e. Linehan 1993a, 1993b; Newman, 2009). These findings provided a basis for the subsequent testing of Hypotheses 2, 3, 4 and 5, which sought to more closely investigate these constructs.

5.5.2 Hypothesis 2

The results from the correlational analysis outlined above lend support for the hypothesis that mother, father, peer, and romantic partner attachment-related variables would be differentially important in predicting NSSI (H2). As outlined above, Attachment Avoidance with Father demonstrated the strongest point biserial correlations with NSSI. Logistic regression analysis allowed for examination of the relative importance of various attachment factors. When all variables were included in the model, only two attachment-related variables uniquely predicted NSSI behaviours, which supported Hypothesis 2. Attachment Anxiety with Father was the strongest predictor of NSSI behaviours, and Attachment Anxiety with Romantic Partner also predicted NSSI behaviours.

The current study is the first to examine the relative importance of attachment-related avoidance and anxiety across mother, father, best friend, and romantic partner relationships in predicting NSSI. At the most basic level, the finding that father and romantic partner attachments were most important in predicting NSSI for the current sample, supports the notion that individuals possess relationship-specific working models or mental representations that may be differentially important in influencing behaviour (Bloom and Djik 2007; Collins & Read, 1994; Cozzarelli, Hoekstra, & Bylsma, 2000). Authors such as Shaver and Mikulincer (2008) reason that while individuals may hold numerous relationship-specific models, interactions with major
attachment figures are deemed most important, with the strongest impact on expectations, feelings and behaviours. The current findings emphasise the particular importance of father and romantic partner relationships on vulnerability to NSSI.

Reports from previous NSSI studies may be used to understand findings. Hallab and Covic (2010) reported that participants who engaged in NSSI had poorer quality of attachment to parents, but not peers. These authors proposed that relationships with early caregivers might be more important in impacting the development of NSSI compared to relationships developed later in life. The current finding that Attachment Anxiety with Father was the strongest predictor of NSSI partially supports this notion, but does not explain why mother attachment relationships were not uniquely predictive of NSSI, and why romantic attachment relationships were. The current study also partially supports findings by Gratz, Conrad, and Roemer (2002) who reported that insecure attachment to father figures was associated with NSSI in female participants but not male participants, and that maternal attachment was not important for either genders. Although the current study did not examine gender differences in the relationship between NSSI and attachment variables, it is noted that the sample was predominantly female (n = 479; 87.89%). It may be that father-daughter relationships are particularly important in the development and maintenance of NSSI in females. Gratz and her colleagues found that other childhood experiences, such as parental separation, appeared more important for predicting NSSI behaviours in males, which is consistent with previous longitudinal research (Hetherington, 1989). Although past theory has not clearly explained this potential gender difference, previous authors have highlighted the significance of the father-daughter relationship on the development of psychopathology, highlighting the need for treatment approaches to address concerns
in this area (Brook, Whiteman, Brook, & Gordon, 1988; Jones, Leung, Harris, 2006; Kelley et al., 2008; Phares & Compas, 1992; Shapiro, 1987).

Results are also consistent with Levesque, Lafontaine, Bureau, Cloutier, and Dandurand’s (2010) findings that current romantic partner attachment is important in predicting NSSI. The finding that romantic partner attachment was a unique predictor of NSSI for the current sample is also congruent with assertions by previous authors (Hazan & Shaver, 1987) that romantic attachment may be particularly important for young adults given their developmental stage. Theoretically, recent romantic interpersonal interactions may be more salient for adolescents and young adults, and therefore may predict current behaviours. In this context, actual or perceived uncertainty in romantic relationships for people with attachment anxieties could be particularly difficult to tolerate. This assertion is supported by previous findings that emphasise that NSSI tends to be precipitated by interpersonal stress (such as loneliness, rejection, or conflict; Hawton & Harriss, 2006; Nock, Prinstein, & Sterba, 2009).

The finding that attachment anxiety was relatively important in predicting NSSI is also interesting. While correlational analyses revealed that attachment avoidance was also associated with NSSI, findings suggest that anxiety dimensions of father and romantic partner attachments were uniquely important in predicting NSSI in the current sample. As specified in Chapter 3, the anxiety dimension of attachment involves fear of abandonment, hyperactivating strategies, pervasive need for closeness or protection, excessive worry about one’s own value, and constant concern regarding the availability and responsiveness of attachment partners (Shaver & Mikulincer, 2009). High attachment anxiety is said to involve the intensification of unpleasant emotions, and has been associated with emotion dysregulation, interpersonal stress
(perceived rejection, disapproval, or abandonment), and personality disorders such as BPD (Meyer & Pilkonis, 2005; Mikulincer & Shaver, 2007; Nickell, Waudby, & Trull, 2002; West, Rose, & Sheldon, 1993). The importance of the association between attachment anxiety and NSSI has been emphasised in previous studies. Stepp et al. (2010) found that the anxiety dimension of attachment predicted interpersonal problems, which in turn predicted NSSI. Similarly, Gormley and McNiel (2010) reported that attachment anxiety was associated with NSSI, and that this relationship was partially mediated by depressive symptoms. Levesque et al. (2010) also report that anxiety over abandonment in romantic relationships is associated with NSSI. With these studies in mind, it appears that attachment-related anxiety in specific relationships may render someone more vulnerable to NSSI.

5.5.3 Hypothesis 3

As was the case with Hypothesis 2, the results from the correlational analysis outlined earlier also lend preliminary support for the hypothesis that various facets of emotion regulation would be differentially important in predicting NSSI (H3). As outlined above, although all factors of emotion regulation were related to NSSI, the STRATEGIES factor demonstrated the strongest point biserial correlation with NSSI. Logistic regression analysis allowed for further examination of the relative importance of various factors. When all variables were included in the model, STRATEGIES was the only factor of emotion regulation that uniquely predicted NSSI behaviours in participants.

The finding that the perception of ‘limited access to emotion regulation strategies’ was the most important factor in predicting NSSI behaviours is somewhat consistent with previous research. As highlighted in Chapter 4, the few authors that
have also employed the DERS (Gratz & Chapman, 2004) report inconsistent findings regarding the subtypes of emotion regulation that appear to be most important in predicting NSSI. The inconsistencies between the extant studies may relate to the fact that studies have recruited participants from diverse populations (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Heath, Toste, Nedecheva, & Charlebois, 2008). The current findings are consistent with previous studies by Gratz and Roemer (2008) and Heath, Toste, Nedecheva, and Charlebois (2008). Other authors, however, have reported that ‘lack of emotional clarity’, ‘impulse control difficulties’, ‘nonacceptance of emotional responses’, and/or ‘difficulties engaging in goal directed behaviour’ may also be uniquely important (Buckholdt, Parra, & Jobe-Shields, 2009; Gratz & Chapman, 2007; Slee, Garnefski, Spinhoven, & Arensman, 2008).

As described in section 5.3.2.3, the STRATEGIES factor of the DERS reflects a respondent’s belief that he or she has few strategies that can be implemented to manage emotions or stressors effectively (Gratz & Roemer, 2004). Given that theoretical and empirical literature has suggested that individuals may ultimately resort to NSSI due to lowered self-efficacy and perceived lack of alternative and/or available coping strategies to immediately and effectively deal with distress (Nock, 2009; Fliege et al., 2004), it makes theoretical sense that this factor is the strongest predictor of NSSI. That is, whilst other factors pertaining to emotion regulation render someone more vulnerable to NSSI, the perception of having limited or no alternative coping strategies to access and implement in the face of overwhelming negative affect may ultimately precipitate the onset and/or the maintenance of NSSI behaviours as a method of coping. This finding supports the use of intervention strategies that assist individuals with self-injurious behaviours to develop adaptive coping strategies, and
to challenge beliefs that there are no alternative methods of managing distressed, as suggested by authors such as Newman (2009).

The finding that all factors of the DERS had significant zero-order correlations with NSSI, but that only ‘limited access to emotion regulation strategies’ was a unique predictor when variables were included together, supports the aforementioned notion that this factor mediates the relationship between NSSI and other facets of emotional regulation as measured by the DERS. This was tested through Hypothesis 4.

5.5.4 Hypothesis 4

Path analysis revealed partial support for Hypothesis 4, which stated that the STRATEGIES factor of emotion regulation would partially mediate the relationship between NSSI and GOALS, IMPULSE, AWARENESS, CLARITY, and NONACCEPTANCE. As demonstrated in Figure 4 in section 5.4.5, path analysis revealed that STRATEGIES fully mediated the relationship between NSSI and NONACCEPTANCE, GOALS, IMPULSE, and CLARITY. STRATEGIES partially mediated the relationship between NSSI and AWARENESS, although the mediation relationship was found to be very weak.

Findings from the current study suggest a theoretical model whereby increases in failure to accept emotional responses, difficulties engaging in goal-directed behaviours, difficulty controlling impulses, and lack of emotional clarity, led to an increase in perceived lack of access to emotion regulation strategies, which in turn led to NSSI. It appears that those who reported a tendency to experience guilt or shame around their emotions, trouble understanding and making sense of their feelings, inability completing tasks when upset, and feeling out-of-control when distressed
were more likely to experience low self-efficacy around the implementation of emotion regulation strategies, which led to reliance on NSSI as a coping mechanism. This is consistent with authors who have posited that longer-term distress may result from a pervasive failure to understand and accept emotions and engage in value-driven behaviour (Hayes, Strosahl, & Wilson, 1999; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), and that NSSI may be somewhat related to impulsivity (Evans, Platts, & Liebanau, 1996; Herpetz, Sass, & Favazza, 1997). While causality cannot be implied from the cross-sectional data obtained in this study, it appears that NONACCEPTANCE, GOALS, IMPULSE, and CLARITY factors may impact upon the cognitions a person holds about his or her ability to deal with stressors as they arise, which may then influence behaviours such as NSSI.

AWARENESS was found to be directly related to NSSI, whereby an increase in lack of emotional awareness led to an increase in the likelihood that respondents would report NSSI behaviours, which is consistent with previous theory that suggests that attending to, and acknowledging emotions may be important to protect against psychopathology (Hayes, Strosahl, & Wilson, 1999; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Somewhat unexpected was the finding that AWARENESS and STRATEGIES had a weak negative relationship, whereby an increase in ‘lack of emotional awareness’ led to a decrease in ‘limited access to emotion regulation strategies’, which in turn led to an increase in the likelihood of NSSI. It may be that failure to attend to internal negative experiences is associated with less perceived need for emotional coping strategies, and therefore results in less frequent concerns regarding the availability of these coping mechanisms. The proposed model whereby STRATEGIES mediated the relationship between AWARENESS and NSSI was very weak, however, and statistical significance of the relationship between AWARENESS
and STRATEGIES (which revealed a standardised estimate of -0.06) may simply be an artefact of the large sample size in the current study. The findings indicated that the direct relationships between AWARENESS and NSSI were relatively stronger than those that were indirect and through STRATEGIES. This suggests that NSSI may also be directly precipitated or maintained by a failure to pay attention to emotional experiences. Theoretically, it may be that a lack of awareness of emotions, which may involve tendencies to somewhat suppress or deny negative affect, may lead to NSSI behaviours that are performed impulsively or without adequate consideration or forethought. Alternatively, it may be that NSSI acts as a way of maintaining emotional avoidance in individuals with a tendency to cope by disengaging or not acknowledging painful internal experiences.

The latter finding has distinct clinical relevance, as it suggests that intervention protocols that facilitate awareness of internal experiences may be particularly beneficial in preventing self-injurious behaviours. Techniques such as mindfulness, which is a component of treatment protocols such as acceptance and commitment therapy (ACT; see Hayes, Strosahl, & Wilson, 1999) and dialectical behaviour therapy (DBT; see Linehan 1993a, 1993b), may be particularly beneficial for facilitating greater non-judgmental emotional awareness. Authors such as O’Brien, Larson, and Murrell (2008) propose that mindfulness may also enhance skills in other domains of emotion regulation too, suggesting additional and broader long-term benefits. The current findings also support authors like Armey (2012), who has discussed the role of self-monitoring in the treatment of NSSI, and demonstrated the utility of technologies using ecological momentary assessment methodologies in facilitating this process.
5.5.5 Hypothesis 5

Lastly, partial support was also found for the hypothesis that emotion regulation would mediate the relationship between attachment-related variables and NSSI. Findings are graphically displayed in Figure 5, section 5.4.6. While difficulties regulating emotions mediated the relationship between NSSI and various attachment variables (including attachment-related anxiety with romantic partner and best friend, and attachment-related avoidance with mother, father, and romantic partner), pathways to emotion regulation from attachment-related anxiety with mother and father, and attachment-related avoidance with best friend were not statistically significant.

These findings highlight the importance of intimate relationships in predicting psychopathology in the current cohort. According to the model, higher levels of attachment-related avoidance in relationships with mother, father, and romantic partner were associated with an increase in global scores on emotion dysregulation (which comprised the six factors outlined in section 5.3.2.3), which was also associated with an increased likelihood that an individual would engage in NSSI behaviours. As outlined earlier, attachment avoidance involves a tendency to limit the experience of negative affect by avoiding close relationships or dependence on others (Shaver & Mikulincer, 2009). This tendency has been shown to decrease the use of support seeking and associated coping strategies when individuals are faced with stressors, leading to heightened levels of distress in the long-term, as outlined in Chapter 3. High levels of attachment avoidance may impact one’s ability to attend to and understand internal experiences, and ultimately engage in effective emotion regulation strategies. It appears that attachment avoidance in parental and romantic
partner relationships is particularly important in precipitating and/or maintaining emotion dysregulation, and that this may lead to NSSI behaviours.

The model also demonstrated that higher levels of attachment-related anxiety in romantic partner and best friend relationships was associated with an increased likelihood of NSSI behaviours, and that these associations were mediated by difficulties in emotion regulation. With the earlier assertion that current romantic partner relationships may be particularly important in understanding behaviours in adolescents and young adults, it appears that anxiety in peer relationships may also be critical in triggering or maintaining emotion regulation deficits in individuals seeking to individuate from caregivers. As described earlier, attachment anxiety, which involves the intensification in unpleasant emotions, and hypersensitivity to perceived rejection, abandonment, or disapproval in close relationships, can disrupt many stages of the emotion regulation process (Mikulincer & Shaver, 2007). With a tendency to experience high levels of negative affect, such individuals appear more likely to engage in NSSI, as depicted in the model. Theoretically, fear of perceived rejection and abandonment in both intimate and non-intimate relationships may impact on the development of unhealthy coping strategies and NSSI.

Interestingly, although attachment-related anxiety with one’s father emerged as the strongest predictor of NSSI in the logistic regression analysis, the findings did not support the hypothesis that this association would be mediated by emotion dysregulation. Attachment-related avoidance in maternal relationships also did not have a significant pathway to emotion dysregulation. Given the number of variables in this path model, nonsignificance in these pathways may reflect inadequate power in the current study. With existing theories stating that the relationship between insecure attachment and NSSI may also be mediated by negative core beliefs, a tendency to be
overly self-critical, or a tendency to dissociate (Yates, 2004), it may also be that the relationship between parental attachment anxiety and NSSI is mediated by other factors not investigated in the current study. This being said, it is also important to note that parental attachment may be less predictive of current emotion regulation patterns in young people. While paternal attachment was shown to be particularly important in predicting NSSI behaviours, perhaps this association is somewhat longstanding. The relationship between parents and young adult responders may have changed, in that they may no longer live in the family home, and may not interact with them as much as they do with friends and partners. In this context, relationships with friends and partners may be most important to current emotion dysregulation patterns.

Although the current study is the first to test the proposed pathway from attachment to NSSI through emotion regulation, findings partially support existing theory and research. As described in Chapter 3, Cassidy (1994) reasons that unhealthy attachments may involve attempts to limit (in the case of avoidance) or heighten (in the case of anxiety) experiences of negative affect, which may in turn lead to problems coping with distress. Difficulties coping with distress may lead to NSSI, which may act as a regulation strategy (Gratz & Chapman, 2007; Linehan, 1993a). Attachment has been shown to influence coping strategies (Marshall, Serran, & Cortoni, 2000; Mikulincer & Florian, 1998), beliefs about being able to cope (Buelow, Lyddon, & Johnson, 2002; Wei, Heppner, & Mallinckrodt, 2003), support seeking (Florian, Mikulincer, and Buckholtz, 1995; Larose, Berier, Souey, & Duchesne, 1999), and emotional reactions (Berant, Mikulincer, & Florian, 2001; Maunder, Lancee, Nolan, Hunter, & Tannenbaum, 2006). The current study supports previous literature on the relationship between attachment, emotion regulation, and
NSSI, however reveals that the model does not hold for all dimensions of specific attachment relationships.

Findings from the current study suggest that romantic partners are particularly important in the development and/or maintenance of NSSI behaviours, and that this relationship is mediated by emotion regulation deficits. With researchers traditionally focusing on the impact of relationships with caregivers on NSSI behaviours (Gratz, Conrad & Roemer, 2002; Hallab & Covic, 2010), the current study supports assertions by recent authors who have emphasised that intimate and current relationships may be particularly influential in NSSI with young adults (Levesque, Lafontaine, Bureau, Cloutier, and Dandurand, 2010). This has particular implications for clinical practice. While the importance of considering an individual’s psychosocial environment and involving family members in treatment has been well documented (Kissil, 2011; Martire, Lustig, Schulz, Miller, & Helegesom, 2004; Schade, 2013; Selekman, 2010; Vale, Nixon, & Kucharski, 2009), these findings suggest that it is also necessary to focus on intimate relationships that may be contributing to difficulties, confirming the view that vulnerable individuals should be assisted to develop healthy relationships into adulthood. This finding provides support for treatment protocols that enhance interpersonal skills, such as learning to set personal boundaries, communicate assertively, and problem-solve in interpersonal situations, and suggests that (where appropriate) couples therapy may have benefits for individuals with a tendency to engage in NSSI behaviours.

5.5.6 Limitations of the Current Study

Despite providing evidence for the importance of specific attachment relationships and facets of emotion regulation in the practice of NSSI, several
limitations of this study must be considered when interpreting the results. First, a significant limitation of the current study relates to the fact that it utilised correlational and cross-sectional survey data. Although theoretical models were developed and tested using path analysis, causality cannot be established without employing longitudinal designs. In the absence of time sequence data, mediation conducted cross-sectionally can result in biased models, which may not reflect the true state of variable relationships (Maxwell & Cole, 2007 & Maxwell, Cole, & Mitchell, 2011). Indeed, the temporal order of the associations examined during the current study may differ in reality from the predictions discussed herein. It may be, for instance, that rather than suggesting that the relationship between NSSI and attachment is mediated by emotion regulation, it is just as possible that poor emotion regulation leads to greater perceived conflict in relationships (or influences the choice of relationships), which may impact upon NSSI behaviours. There is also concern with the reliance on retrospective self-reports of NSSI, and experiences in relationships and managing emotions. It is difficult to ascertain the actual occurrence of these phenomena, and there is likely to be an element of retrospective bias in reports from participants. Although participation was voluntary and responses were anonymous, reports may be influenced by factors such as one’s willingness to disclose, as well as their insight or ability to accurately report on prior behaviours and experiences. Further, selection bias may have occurred as a result of the fact that the study was advertised on psychology- and mental health-related webpages, and participants were informed that the intention was to examine NSSI, which led to a higher proportion of individuals with NSSI histories compared to most populations. Indeed, the prevalence of NSSI in the current sample (83.12%) is unusually high.
While the sample was relatively large, and recruitment was not confined to university students, it was not clear how representative of the general population it was. There was a wide age range and a significant gender bias, with almost 90% of the participants being females. Given that previous research has reported gender differences in NSSI risk factors (i.e. Gratz, Conrad, and Roemer, 2002), these differences may have biased the current findings, which in turn limits the generalizability of results to both genders. This highlights an additional limitation of the study, in that statistical analyses did not control for the oversampling of females and the wide age range of participants, which would have increased the reliability of reported findings. In addition to this, and likely as a result of the online sampling method, participants were mostly adolescents and young adults, and these findings may not be generalisable to older adults.

A final concern with the current study is the fact that the mental health history of participants was not obtained during data collection. It would be useful to know whether participants met criteria for disorders such as BPD, depression, and anxiety, or whether they had recently received a mental illness diagnosis, in order to control for the potential influence of symptoms associated with these conditions on reports of attachment and emotion regulation.

5.5.7 Concluding Remarks and Directions for Future Research

The limitations outlined above provide a basis for recommendations for future research. To begin with, it would be useful for results from the current study to be repeated using a more representative sample of individuals in the community. It is particularly necessary to ascertain whether the current findings hold when there are more males included in the sample, and/or whether there are any significant gender
differences in these associations or hypothesised models. It would also be interesting
to examine the effect of NSSI recency, to see whether the variables included in the
study are differentially related to past, current, or no NSSI, with the view that this
may influence early intervention. Future studies should also attempt to control for
other symptoms of psychopathology that may impact upon the observed relationships.
In addition to this, longitudinal research is required to ascertain whether the predicted
temporal associations can be verified, in order to determine causality. Given
previously reported associations between childhood trauma and emotion
dysregulation and childhood attachment (Gratz & Chapman, 2007; Gratz & Roemer,
2008; Prinstein, Guerry, Browne, & Rancourt, 2009), it would also be interesting for
longitudinal studies to examine whether childhood maltreatment (such as abuse and/or
neglect) should be included in the predicted model of NSSI.

From this and other work, it can be seen that problematic attachment appears
to relate to NSSI partly in terms of how individuals learn to respond to distress.
Difficulties in experiencing and managing emotions have been strongly associated
with NSSI in this and other literature, and the theoretical model developed through the
current study demonstrates that this may originate from specific relationship variables.
The use of research methods involving longitudinal or moment-to-moment assessment
to examine emotion regulation in people with and without a history of NSSI would
give more ecologically valid and specific information from which to draw casual
inference about these associations. An accurate understanding of the way in which
individuals experience affect and cope with stressors in their daily lives could have
utility for the prevention or treatment of NSSI behaviours. This assertion provided a
basis for a second study, which is described in Chapter 6.
Chapter 6: Study 2

How Individuals With A Recent History of Self-Injury Experience and Cope With Emotions – A Real-Time Ecological Momentary Assessment Study

6.1 Overview

Study 2 of the current research project employed ecological momentary assessment (EMA) methodology to examine whether individuals with and without a recent history of self-injury differed in terms of moment-to-moment experiences of emotions and their ability to cope with negative affect. The aims, hypotheses and method for this study are presented below, with the results of the study to follow.

6.2 Aims, Research Questions and Hypotheses

As has been previously discussed, the empirical literature in the area of NSSI is limited by the fact that the vast majority of studies are cross-sectional in design, employing retrospective self-report measures. Recent authors (Armey, 2012; Armey, Crowther, & Miller, 2011; Muehlenkamp et al., 2009; Nock, Prinstein and Sterba, 2009) have emphasised the need for real-time ecological research to be employed, reasoning that this will add an important depth of knowledge to the current literature. Ecological momentary assessment (EMA), otherwise known as journaling or experience sampling, relates to a set of techniques that enable researchers to examine experiences and events in their natural environment or context over time (Bolger, Davis, & Refaeli, 2003). These methods are considered complementary to cross-sectional studies, and may address some of the limitations of traditional methodologies relating to inferring causality and the ability to generalise to real life
scenarios (Reise, Erber, & Gilmour, 1994). Innovative EMA technologies allow for the collection of ecologically valid data reflecting individuals' ongoing behaviours, thoughts, feelings, and circumstances in ways that are minimally intrusive (Bolger, et al., 2003).

As highlighted through the earlier review of the literature, research suggests that individuals who engage in NSSI may report greater negative affect (Fliege, Lee, Grimm, & Klapp, 2009), and affect instability (Linehan, 1993a) than those who do not. With scholars having discussed the affect regulatory function of NSSI (Chapman, Gratz, & Brown, 2006; Nock & Prinstein, 2004), recent EMA studies have significantly contributed to the field by finding ecologically valid support for the notion that NSSI leads to a reduction in negative mood (Armey, Crowther, & Miller, 2011; Meuhlenkamp et al., 2009). Nonetheless, there is still need for further studies in this area, and to date there has not been an EMA study to assess moment-to-moment fluctuations in mood in individuals who engage in NSSI.

As was also discussed, although preliminary research suggests that individuals with a tendency to engage in NSSI may employ more emotion-focused and/or disengagement coping and less engagement and/or problem-focused coping (Andover, et al., 2007; Cawood & Hubrich, 2010; Hasking et al., 2010; Williams & Hasking, 2010) than those without a history of NSSI, research in this area is limited by reliance on retrospective reports and cross-sectional survey data. Further research is required to assess whether individuals with and without a tendency to engage in NSSI generally report different coping strategies in their daily lives. In addition to this, and given the assertion by coping theorists (Folkman & Lazarus; Lazarus, 1991; Lazarus & Folkman, 1984) that individual coping strategies may not be uniformly adaptive or maladaptive, it would be useful to determine whether various strategies are associated
with changes in affect over time for individuals who engage in NSSI. Study 2 aimed to examine these issues identified in the literature.

Building on the foundations of Study 1, which found that attachment relationships and an ability to accurately identify, process, and cope with emotions were important in predicting whether someone would engage in NSSI, the current study aimed to explore moment-to-moment changes in affect and coping styles in individuals with and without a recent history of NSSI. The following research questions were posed at the commencement of the study:

RQ1: Is there individual variation in terms of moment-to-moment experiences of dimensions of negative and positive affect over time? If so, can this difference be explained by group membership (NSSI versus non-NSSI), emotion regulation, alexithymia, and/or attachment-related anxiety and avoidance?

RQ2: Is group membership (NSSI versus non-NSSI) predictive or related to the type of coping strategies individuals employ to manage negative affect?

RQ3: Do reported coping strategies differ with regard to their effectiveness in reducing negative affect over time?

In line with the existing theoretical and empirical literature, a number of hypotheses were developed. Given that previous cross-sectional research has found that individuals who have recently engaged in NSSI tend to score higher on measures of negative mood (Brown, Williams, & Collins, 2007), it may be expected that they would more frequently experience high negative affect and less frequently experience
positive affect. In addition to this, given that personality disorders commonly associated with NSSI are characterised by instability in mood (American Psychiatric Association, 2013; Linehan, 1993a), and given the notion that individuals with a history of NSSI are more likely than individuals without a history of NSSI to demonstrate difficulties regulating their emotions (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Gratz & Tull, 2010; Heath, Toste, Nedecheva, & Charlebois, 2008; Slee, Garnefski, Spinhoven, & Arensman, 2008), it may be expected that they will experience greater and more intense fluctuations in mood states over time. On the basis of this, the following hypotheses were made:

**H1:** Compared to respondents in the Non-NSSI group, participants in the NSSI group will report more frequent negative affect and less frequent positive affect over time.

**H2:** Respondents in the NSSI group will report greater fluctuations in affect over time, compared to those in the Non-NSSI group.

In addition to these hypotheses, based on past theory and research that has specified that individuals with NSSI behaviours tend to engage in greater emotion-focused and avoidant coping when faced with stressors (Andover, et al., 2007; Cawood & Hubrich, 2010; Hasking et al., 2010; Williams & Hasking, 2010), it was expected that respondents in the NSSI group would differ from those in the Non-NSSI group in terms of the type of coping strategies most commonly employed. Specifically, the following hypothesis was made:
H3: When experiencing negative affect, participants in the NSSI group will more frequently report the use of disengagement or avoidant coping strategies, and respondents in the Non-NSSI group will more frequently report the use of engagement or problem-focused coping strategies.

Finally, based on previous literature that specifies that engagement and problem-focused coping tends to be associated with better psychological outcomes than emotion-focused and disengagement coping (Higgins & Endler, 1995; Ptacek, J. T., Smith, R. K., & Zanas, J., 1992), it was expected that these strategies may be differentially effective in managing affect over time. Given assertions, however, that coping styles may not be uniformly adaptive or maladaptive (Lazarus, 1991), it was expected that the effectiveness of these strategies may differ across individuals, and that other factors such as attachment, emotion regulation and alexithymia may influence this relationship. As such, the following hypotheses were specified:

H4: Engagement coping will lead to a reduction in negative affect over time, and disengagement coping will lead to an increase in negative affect over time.

H5: The effectiveness of engagement and disengagement coping will be moderated by trait level and background variables (including history of NSSI and baseline emotion regulation skills, alexithymia, and attachment-related anxiety and avoidance).
6.3 Method

6.3.1 Participants

Data from 38 participants were included in Study 2. Of these individuals, there were 4 men and 34 women. The age of participants ranged from 18 to 47 years ($M = 22.21; SD = 5.27$). Respondents were sourced via advertisements posted at various locations across two university campuses located in metropolitan Melbourne and regional Victoria, as well as on university websites. To participate in the study, individuals were required to be above the age of 18 and possess a mobile phone with the capacity to access the Internet. Recruitment advertisements also stipulated that researchers were seeking individuals who identified as belonging to one of the following two categories – (1) those with a recent (3-6 month) history of non-suicidal self-injury, or (b) those with no past history of non-suicidal self-injury. Respondents interested in participating in the study were informed that they would be placed in a raffle to receive a $100 gift voucher.

6.3.2 Measures

To achieve the aims of the study, two questionnaires were developed. The first of these was employed at Phase 1 to assess baseline characteristics, and included items pertaining to basic demographic information, as well as measures of attachment in specific relationships, emotion regulation skills, alexithymia, and NSSI history that were included in Study 1. The second questionnaire was employed for the ecological momentary assessment (EMA) phase of the study, Phase 2, and incorporated a measure of current affect, as well as a series of open-ended questions.

6.3.2.1 Phase 1: Baseline measures

At baseline, participants were required to complete a demographics sheet
comprising various items, including gender, date of birth, marital status, country of birth, current location, Aboriginal and Torres Strait Islander status, and level of education. Following on from this, the measures utilised in Study 1 comprised the remainder of the baseline questionnaire. These included the ECR-RS (Fraley, Heffernan, Vicary, & Brumbaugh, 2011) as a measure of attachment-related anxiety and avoidance, the DERS (Gratz & Roemer, 2004) as a measure of emotion dysregulation, the TAS-20 (Bagby, Parker, & Taylor, 1994) as a measure of alexithymia, and the DSHI (Gratz, 2001) as a measure of NSSI history. Readers are referred to the Method subsection of Study 1 for a complete summary of these scales and their psychometric properties.

**6.3.2.2 Phase 2: EMA**

For the EMA phase of the study, the Dispositional Mood Scale (reduced version; Huelsman, Nemanick, & Munz, 1998) was employed to assess participants’ mood and emotions. The Dispositional Mood Scale is a commonly used instrument that measures mood using both poles (high and low) of positive and negative affect, providing scores for four representative affects (activated positive, deactivated positive, activated negative, and deactivated positive). It requires respondents to report the degree to which they are currently experiencing a total of 16 common emotions – active, energetic, lively, vigorous, exhausted, fatigued, tired, worn out, aggravated, agitated, hostile, upset, peaceful, relaxed, serene, and tranquil. For the current study, participants responded to items on a ten-point Likert scale (where 1 = ‘does not apply to me at all’, and 10 = ‘applies to me completely’). Huelsman and his colleagues (1998) report high internal consistency for each of the subscales of the measure, with alpha coefficients ranging from .87 to .93. Reliability analysis on data from the present study also revealed high internal consistency for activated positive
affect ($\alpha = 0.95$), activated negative affect ($\alpha = 0.91$), deactivated positive affect ($\alpha = 0.93$) and deactivated negative affect ($\alpha = 0.95$).

An additional component of the EMA phase included two open-ended questions that pertained to precipitants and outcomes related to reported affect. Participants were asked the following - (a) “Discuss what you believe may have led to you feeling the way you are right now”, and (b) “Discuss what you plan to do in response to the feelings you have reported”. The last EMA time-point contained one additional item, which asked respondents to reflect on the past 14-day period and identify if and when they had engaged in non-suicidal self-injurious behaviour.

### 6.3.3 Procedure

Ethics approval from the Deakin University Human Research Ethics Committee (DUHREC) was obtained prior to commencement of the study (see Appendix A). At the recruitment stage, participants expressed interest in participating in the study via email, and were then provided with a comprehensive Plain Language Statement (see Appendix C) outlining details such as the study’s purpose and background, and precisely what participation would involve. At the onset of the study, the student researcher met face-to-face with each potential participant to explain the research protocol. During a 20-30 minute meeting, written consent from participants was obtained, starting dates (within the next 7 days) for the ecological momentary assessment (EMA) component were determined, and the baseline questionnaire was completed. Within approximately one to seven days of the start-up meeting, participants began the EMA component of the study. This involved using their mobile phones to respond to the brief EMA questionnaire, which was expected to take approximately 2-5 minutes to complete. A text message was sent to each participant at
random time points between the hours of 9.00 am and 9.30 pm, five times per day for a period of 14 days in total. It was deemed important that the EMA be composed of random, rather than event-queued, assessments, so that data could more accurately reflect daily emotional experiences of those with and without self-injurious behaviours, regardless of stressors or particular events that may influence reported mood. Text messages were queued ahead of time and sent via a SMS scheduling service (Red Oxygen). Each text message prompted participants to complete the questionnaire via a personalised URL link. Participants were advised to complete the questionnaire as soon as they were able, after receiving the text notification. They were informed that the URL would be unmonitored for the duration of the study. Once participants had completed the assessment via their personalised portal, de-identified data was stored online in a locked file that was only accessed by the researchers at the completion of data-collection.

6.3.4 Data Analytic Strategy

As participants each provided multiple (up to 70) reports of affect over the course of the study, the data were naturally hierarchical in nature, which necessitated the use of multilevel modeling (MLM) techniques that would control for non-independence of scores over time and allow for accurate modelling of trait-level moderators of inter-individual differences in state-based (Level 1) associations (Hox, 2010). In MLM procedures, the number of observations (rather than the number of participants) is the unit of analysis, which allowed for procedures to be carried out in the presence of a small sample. Three MLMs were utilised to answer the research questions and evaluate the hypotheses specified at the beginning of the project. These are explained in more detail below. All MLMs were tested in Mplus version 7.1 using
Full Information Maximum Likelihood (FIML) estimation, with robust standard errors to control against potential bias to parameter estimates attributable to outliers or non-normality (Muthén & Muthén, 1998-2012).

6.3.4.1 Model 1: Hypothesis 1 and 2

The statistical notation for Model 1 is included below. In order to assess whether individuals differed in their experiences of affect over time (H1), moment-to-moment estimates of affect (Level 1) were nested within days (Level 2) and within individuals (Level 3). At Level 3, the following predictor variables were analysed individually: group membership (NSSI versus non-NSSI), emotion dysregulation, alexithymia, and attachment-related anxiety and avoidance. The analysis was repeated for all four domains of affect measured during Phase 2 of the study – Activated Positive, Deactivated Positive, Activated Negative, and Deactivated Negative. To allow for accurate assessment of within-group effects, continuous predictors at the lower levels were group-mean centred, and the individual mean was added to Level 3. Predictors at Level 3 were left uncentred. To control for the fact that times between assessment points varied within and between participants (due to the use of random assessment schedules), an additional variable for the time lag between entries was included as a covariate in the analysis.

Following this, additional analyses were conducted to determine whether individuals in the NSSI and Non-NSSI groups differed in the degree to which their emotions fluctuated over time (H2). This involved the following process: (a) repeating the above MLM procedure for NSSI and non-NSSI groups separately without including Level 3 predictor variables, and (b) calculating and comparing the intraclass correlation coefficient (ICC) values and their confidence intervals to determine whether there was overlap in the confidence intervals for the two groups. ICC refers
to the correlation among observations within a cluster (Park & Lake, 2005). It is a
descriptive statistic that examines the relationship between measures within classes
and provides an index for how strongly units in the same group resemble each other
(Bland & Altman, 1990). In multilevel modeling, ICC values can be used to estimate
the amount of variance in individual level responses that can be explained by group
level properties (Castro, 2002). ICC values range from 0 to 1 (Sedgwick, 2013).
Higher values indicate greater variability in the dependent variables for the clustering
or grouping variable at level two of a multilevel model. In the case of the current
study, larger ICC values indicated greater variability in mood (Level 1) across days
(Level 2), and smaller ICC values indicated less variability in mood across days. ICC,
written as the symbol “\( \rho \)”, can be calculated using the formula below, where “\( \sigma_{u0} \)” is
the variance of clusters and “\( \sigma_e \)” is the variance of Level 1 observations (Garson,
2013; Park & Lake, 2005).

\[
\rho = \frac{\sigma_{u0}^2}{\sigma_{u0}^2 + \sigma_e^2}
\]

Hopkins (2009) provides a spreadsheet with which to calculate the confidence
limits around ICC values. If the proportion of overlap between 95% confidence
intervals was 0, or there was a positive gap between the confidence intervals, there
was said to be a significant difference (\( p < .01 \)) between each group in the degree to
which affect varied over time (Cumming & Finch, 2005). If the overlap of the 95%
confidence intervals was equal to or less than approximately half of the average
margin of error, there would be a significant difference at the \( p < .05 \) level (Cumming
& Finch, 2005).
Level 1: \[ Y_{ijk} = \pi_{0jk} + e_{ij} \] (Equation 1)

Level 2: \[ \pi_{0jk} = \beta_{00k} + \beta_{01k} \text{ (DAYS)} \ r_{0jk} \] (Equation 2)

Level 3: \[ \beta_{00k} = \gamma_{000} + \gamma_{001} \text{ (Level 3 IV)} + u_{00k} \] (Equation 3)

**6.3.4.2 Model 2: Hypothesis 3**

The statistical notation for Model 2 is included below. In order to assess whether individuals in the NSSI and Non-NSSI groups differed in the tendency to favour specific coping strategies (H3), a two level MLM was performed. Moment-to-moment estimates of negative affect predicted reported coping strategies (Level 1), and this relationship was nested within individuals (Level 2). As the Level 1 outcome variable was dichotomous (engagement and disengagement coping), a Bernoulli distribution-based model was used to accurately assess the Level 1 association. At
Level 2, the grouping variable (NSSI versus Non-NSSI) was included to predict individual variance in the relationship between negative affect and coping strategies. The analysis was repeated for each category of coping. As with Model 1, the continuous predictor at Level 1 was group-mean centred, and the individual mean was added at the individual level (Level 2 in this model), to allow for accurate assessment of within-group effects. Predictors at Level 2 were left uncentred. The time lag variable was again added as a covariate to the control for the fact that times between assessment points varied within and between participants (due to the use of random assessment schedules). See statistical notation below.

Level 1: \[ Y_{ijk} = \pi_{0jk} + \pi_{1jk} \times \text{(Negative Affect)} + e_{ij} \]  
(Equation 3)

Level 2: \[ \pi_{0jk} = \beta_{00k} + \beta_{01k} \times \text{(NSSI)} + u_{00k} \]  
(Equation 4)

- \( Y_{ijk} \): The outcome variables (coping strategies – Engagement Coping, and Disengagement Coping)
- \( \pi_{0jk} \): The intercept for the outcome variable
- \( \pi_{1jk} \): The random effect for the Level 1 relationship between Negative Affect and the outcome variable
- \( \beta_{00k} \): The intercept for the Level 1 random effect
- \( \beta_{01k} \): The slope for the cross-level interaction between the Level 2 predictor (NSSI) and the Level 1 random effects
- \( e_{ij} \): The residual error term at Level 1
- \( u_{00k} \): The residual error term at Level 2
6.3.4.3 Model 3: Hypothesis 4 and 5

The statistical notation for Model 3 is included below. In order to assess variations in the effectiveness of coping strategies over time (H4 and H5), another series of two-level multilevel models were performed. At Level 1, moment-to-moment estimates of affect were predicted by affect reported at previous time points as well as reported coping strategies. Affect assessed at the previous time point was included as a covariate to evaluate whether various coping strategies would lead to a reduction in negative affect. This was nested within individuals (Level 2). At Level 2 the grouping variable (NSSI versus non-NSSI) and baseline Emotion Regulation, Alexithymia, Attachment Avoidance, and Attachment Anxiety scores were included as predictors. These predictors were entered individually to control for multicollinearity. Continuous predictors at Level 1 were group-mean centred, and the individual mean was added to Level 2. The dichotomous predictor at Level 1 (coping strategies) was left uncentred, as were predictors at Level 2. The time lag variable was again added as a covariate to the control for the fact that times between assessment points varied within and between participants (due to the use of random assessment schedules). See statistical notation below.

The analysis was repeated over five time points, where the lag between the first measurement of negative mood (Time 0) and the final outcome varied from one time point (minimum 1.5 hours) to five (minimum 7.5 hours). Examination of five EMA assessment points allowed for a more accurate estimate of the relationship between coping strategies and negative mood within individuals. Multiple estimates of the association meant that results would be less influenced by extreme or outlying instances where the relationship between coping and affect would be stronger or weaker than normal. It was thought that the outcome associated with the application
of coping strategies may differ over time, and it was reasoned that examination of up to five time points would be sufficient to detect subsequent changes in the strength of Level 1 associations within individuals. Time points beyond the fifth entry were not examined, as it was reasoned that it might not be meaningful to examine mood that was so far removed from the implementation of a coping strategy, with the assertion that other extraneous variables would be more likely to impact the association.

Level 1: \[ Y_{ijk} = \pi_{0jk} + \pi_{1jk} \times (\text{NegAffect T0}) + \pi_{2jk} \times (\text{Coping}) + e_{ij} \] (Equation 5)

Level 2: \[ \pi_{2jk} = \beta_{00k} + \beta_{01k} \times (\text{Level 2 predictor}) + u_{00k} \] (Equation 6)

- \( Y_{ij} \): The outcome variables (negative affect at future time points – Time 1, Time 2, Time 3, Time 4, and Time 5).
- \( \pi_{0jk} \): The intercept for the outcome variable
- \( \pi_{1jk} \): The random effect for the Level 1 relationship between Negative Affect at Time 0 and the outcome variable
- \( \pi_{2jk} \): The random effect for the Level 1 relationship between Coping (Engagement or Disengagement) and the outcome variable
- \( \beta_{00k} \): The intercept for the Level 1 random effect
- \( \beta_{01k} \): The slope for the cross-level interaction between the Level 2 predictor (NSSI, Emotion Regulation, Alexithymia, Attachment Anxiety, or Attachment Avoidance) and the Level 1 random effects
- \( e_{ij} \): The residual error term at Level 1
- \( u_{00k} \): The residual error term at Level 2
6.4 Results

6.4.1 Data Cleaning and Preparation

Prior to conducting the analyses described above in the Data Analytic Strategy subsection, a series of data cleaning processes were undertaken. Efforts were made to ensure that the assumptions underlying the statistical procedures proposed for the study were upheld, and to maximise the data available for the study without compromising its integrity. Data cleaning was conducted in accordance with procedures recommended by Tabachnick and Fidell (2007) for multilevel model analyses. This included assessing for missing data, outliers, and normality. Results from these procedures are outlined below. In addition to this, the procedure for coding open-ended response items from Phase 2 data is described.

6.4.1.1 Missing data

While missing data from Phase 2 of the study is not in itself a statistical problem for multilevel modeling procedures, researchers need to decide how much missing data to allow and whether there is a pattern to the missingness which may impact the interpretability of findings (Hox, 2010; Tabachnick & Fidel, 2007). Adopting a cut-off suggested by previous researchers (Colautti et al., 2011; Fuller-Tyszkiewicz et al., 2013), it was determined that participants who had completed above 50% (35 or more) of their EMA entries would be included in the study. In this way 11 cases were initially removed, and 41 were retained for meeting this criteria. Three further cases were removed because these participants had consistently only completed the initial quantitative component of their entries, leaving the open-ended questions missing.

Prior to removing cases, analyses were conducted to evaluate whether the likelihood of missing EMA entries was related to individual difference variables
measured at baseline (Age, Gender, NSSI, Emotion Regulation, Attachment Avoidance, Attachment Anxiety, and Alexithymia). Correlations between the number of entries participants completed and the aforementioned variables were all statistically non-significant (p > .05). Of the cases that were retained, missing values analysis revealed that less than 2% of data was missing across EMA items, and Little’s Missing Completely At Random (MCAR) test demonstrated that the data was missing completely at random ($\chi^2 = 428.88$, df = 440, $p = .64$). This small amount of missing data was replaced using expectation maximisation procedures. Finally, analysis revealed that there was no missing data from the baseline measures assessed during Phase 1.

6.4.1.2 Outliers

Data was assessed for univariate outliers that may have distorted findings through the examination of standardised scores. Across variables, there were no scores in excess of 3.29 ($p < .001$, two-tailed), indicating that there were no univariate outliers (Tabachnick & Fidell, 2007). Mahalanobis distance was used to check for multivariate outliers (Barnett & Lewis, 1994). There were no extreme values detected.

6.4.1.3 Normality

Normality was assessed by calculating the z-scores for skew and kurtosis values for all continuous variables in the study, as well as examination of frequency histograms (Tabachnick & Fidell, 2007). This procedure revealed that the assumption of normality was violated for the four affect-related variables (Activated Positive, Activated Negative, Deactivated Positive, and Deactivated Negative). Most notably, Activated Negative affect appeared positively skewed upon examination of histograms. To control for this violation of normality, robust estimation procedures were utilised when MLM analyses were computed in MPlus.
6.4.1.4 Coding of EMA data

As described in the Method section above, within the EMA component of the study, participants were asked open-ended questions pertaining to stressors that have triggered negative affect and strategies that they would employ to manage or resolve this. Given the open-ended nature of the questions, data were measured qualitatively, which necessitated the use of a system of coding responses into specific coping strategies that could be included in the MLM procedures outlined above. As described in the introductory chapters, coping is a very broad concept, and behaviours that come under that umbrella of coping can be classified in a number of ways. For the purposes of the current study, however, the hierarchical model of coping developed by Tobin, Holroyd, Reynolds, & Wigal (1989) was utilized to classify coping strategies reported. This model is depicted in Figure 7 below. Whilst not classic qualitative analysis using a methodology like grounded theory, this model was chosen as a way of organizing the brief responses in a coherent theoretical framework that was consistent with previous research (which has been outlined in earlier chapters). The benefit of this approach was that categorization could incorporate theories of problem-focused versus emotion-focused coping (Lazarus, 1991), as well as approach and avoidance coping (Maddi, 1980; Roth & Cohen, 1986). Coping was first organized into eight categories: Problem Solving, Cognitive Restructuring, Express Emotions, Social Support, Problem Avoidance, Wishful Thinking, Self Criticism, and Social Withdrawal. These categories could then be classed within dimensions of problem-focused and emotion-focused engagement or disengagement coping. In order to determine which strategy an individual was reporting, researchers examined answers to the open-ended questions at each individual time point when respondents reported a significant amount of negative affect during the EMA phase of the study. The method
for this is described below. Definitions and examples of each coping strategy from the current data set are presented in Table 13 below.

![Hierarchical structure of coping proposed by Tobin et al. (1989)](image)

To begin with, each time point reported by respondents was categorized in terms of the presence or absence of negative affect (0 = Nil Negative Affect, 1 = Negative Affect). Negative Affect was classified as scores above five for the Activated Negative subscales of the Dispositional Mood Scale, which included the following emotions: aggravated, agitated, hostile, and upset. Although there was not an empirical basis for this cut-off, a commonsense approach was employed. A value of five and above on this scale was deemed to be high enough to justify the use of a coping strategy but not so extreme that there would likely be a natural regression to the mean over time.
Table 13

*Definitions and Examples of Coping Strategies from the Current Data*

<table>
<thead>
<tr>
<th>Coping strategy</th>
<th>Definition</th>
<th>Precipitant</th>
<th>Outcome/Strategy</th>
<th>Examples*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Problem Solving</td>
<td>Behavioural and cognitive strategies to reduce or eliminate a stressor by engaging with it directly.</td>
<td>1a) Stuck on a section of this essay.</td>
<td>1a) Call my friend and ask for help with this. Look online for answers.</td>
<td></td>
</tr>
<tr>
<td>(Engagement, Problem Focused)</td>
<td></td>
<td>1b) Fight with my dad about my car.</td>
<td>1b) Calm down then try to work it out with him.</td>
<td></td>
</tr>
<tr>
<td>2. Cognitive Restructuring</td>
<td>Cognitive strategies that alter the emotion attached to a stressor by changing the meaning assigned to it.</td>
<td>2a) Stressed about work. Anxious and tired.</td>
<td>2a) Keep working. Try to think positively - I can do it!</td>
<td></td>
</tr>
<tr>
<td>(Engagement, Problem Focused)</td>
<td></td>
<td>2b) Concerned that my partner is running late and something bad may have happened.</td>
<td>2b) Mentally list all the reasons he could be running late other than having an accident.</td>
<td></td>
</tr>
<tr>
<td>3. Social Support</td>
<td>Seeking emotional support from others, including friends and family members.</td>
<td>3a) I had a fight with my father.</td>
<td>3a) Vent to my partner about the situation.</td>
<td></td>
</tr>
<tr>
<td>(Engagement, Emotion Focused)</td>
<td></td>
<td>3b) Lack of sleep due to distressing nightmares.</td>
<td>3b) Get support from my family.</td>
<td></td>
</tr>
<tr>
<td>4. Express Emotions</td>
<td>Strategies relating to attempts to release or express emotions.</td>
<td>4a) Stressed about mid-trimester exam.</td>
<td>4a) I just want to cry about it.</td>
<td></td>
</tr>
<tr>
<td>(Engagement, Emotion Focused)</td>
<td></td>
<td>4b) Struggling with an essay I am writing.</td>
<td>4b) Wallow in my feelings of hopelessness.</td>
<td></td>
</tr>
<tr>
<td>5. Problem Avoidance</td>
<td>Strategies relating to attempts to escape stressors or associated emotions through methods such as distraction and denial.</td>
<td>5a) Angry at my friend for being so rude.</td>
<td>5a) Forget about it. Take a large amount of sleeping pills and pass out.</td>
<td></td>
</tr>
<tr>
<td>(Disengagement, Problem Focused)</td>
<td></td>
<td>5b) Stressed about the amount of uni work I have.</td>
<td>5b) Watch a movie with my boyfriend.</td>
<td></td>
</tr>
<tr>
<td>6. Wishful Thinking</td>
<td>Passively hoping or wishing that a difficult situation or stressor will change.</td>
<td>6a) Feeling unwell with the flu.</td>
<td>6a) Hope that I feel better before work.</td>
<td></td>
</tr>
<tr>
<td>(Disengagement, Problem Focused)</td>
<td></td>
<td>6b) Fight with colleague at work.</td>
<td>6b) Hope tomorrow will be a better day.</td>
<td></td>
</tr>
<tr>
<td>7. Self Criticism</td>
<td>Reacting to a stressor by blaming oneself.</td>
<td>7a) Seeing myself gaining weight in the mirror.</td>
<td>7a) Cry and be angry at myself.</td>
<td></td>
</tr>
<tr>
<td>(Disengagement, Emotion Focused)</td>
<td></td>
<td>7b) Not getting my assignment done by the due date.</td>
<td>7b) Feel angry and criticize myself.</td>
<td></td>
</tr>
<tr>
<td>8. Social Withdrawal</td>
<td>Responding to a difficult situation by retreating or withdrawing from others.</td>
<td>8a) Being teased by my group of friends.</td>
<td>8a) Go home and be alone.</td>
<td></td>
</tr>
<tr>
<td>(Disengagement, Emotion Focused)</td>
<td></td>
<td>8b) Fight with boyfriend.</td>
<td>8b) Crawl into bed and be alone.</td>
<td></td>
</tr>
</tbody>
</table>

*Note: To maintain privacy and confidentiality the above examples have been modified slightly from reports in the current data set.*
Following this, a procedure was undertaken to code each coping strategy entry associated with negative affect. This involved systematically examining reported precipitants or triggers for negative affect in conjunction with reported strategies for dealing with stress. During the coding procedure, it was noted that there were times when respondents had obtained negative affect scores above the predetermined cut-off but had not qualitatively reported distress or the use of any coping strategies. When this occurred and there was a discrepancy between quantitative and qualitative reports, qualitative entries took precedence and overrode the former. A researcher coded data, and then a random sample of categories (approximately 25% of responses) was reviewed by an independent rater.

Table 14
Endorsement of Various Coping Strategies

<table>
<thead>
<tr>
<th>Coping category</th>
<th>Number of times strategies were endorsed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower Level:</strong></td>
<td></td>
</tr>
<tr>
<td>Problem Solving</td>
<td>300</td>
</tr>
<tr>
<td>Cognitive Restructuring</td>
<td>17</td>
</tr>
<tr>
<td>Social Support</td>
<td>37</td>
</tr>
<tr>
<td>Express Emotions</td>
<td>29</td>
</tr>
<tr>
<td>Problem Avoidance</td>
<td>365</td>
</tr>
<tr>
<td>Wishful Thinking</td>
<td>9</td>
</tr>
<tr>
<td>Self Criticism</td>
<td>4</td>
</tr>
<tr>
<td>Social Withdrawal</td>
<td>11</td>
</tr>
<tr>
<td><strong>Middle Level:</strong></td>
<td></td>
</tr>
<tr>
<td>Problem-Focused Engagement</td>
<td>317</td>
</tr>
<tr>
<td>Emotion-Focused Engagement</td>
<td>66</td>
</tr>
<tr>
<td>Problem-Focused Disengagement</td>
<td>374</td>
</tr>
<tr>
<td>Emotion-Focused Disengagement</td>
<td>15</td>
</tr>
<tr>
<td><strong>Upper Level:</strong></td>
<td></td>
</tr>
<tr>
<td>Engagement</td>
<td>383</td>
</tr>
<tr>
<td>Disengagement</td>
<td>389</td>
</tr>
</tbody>
</table>

Although coping responses were coded using the above eight categories, it was ultimately determined that the two superordinate coping strategies (Engagement and Disengagement) would be used. The reason for this related to the fact that there
were large discrepancies in the size of other groupings, and some of the lower level coping strategies were not endorsed frequently enough for groups to be meaningfully compared. To demonstrate this, Table 14 displays the frequency for each category of coping at each level.

6.4.2 Descriptive Statistics

6.4.2.1 Prevalence of NSSI.

Of the 38 participants in the current study, 50% \((n = 19)\) reported a recent history of NSSI. Of those in the NSSI group, all respondents reported that they had engaged in NSSI behaviours within the past five months. At the onset of the study, the average number of weeks since last NSSI episode was 7.95 \((SD = 6.95)\). Two respondents \((10.53\%)\) had engaged in NSSI within the past week, and nine participants \((47.37\%)\) had engaged in NSSI within the past month. At the conclusion of the study, five participants \((26.32\%)\) reported that they had engaged in NSSI while participating in the study (during the 14 days of Phase 2). Of the remaining individuals, 11 participants \((57.89\%)\) stated that they considered engaging in NSSI while participating in Phase 2 of the study.

It was common for respondents to report having engaged in multiple forms of NSSI. The amount of methods endorsed ranged between one and 11, with participants on average reporting a history of 4.45 different behaviours \((SD = 3.04)\). Table 15 above displays the frequency and percentage of each type of NSSI behaviour measured. The most common method was cutting of the wrists, arms or other areas of the body, with 84.21% of respondents reporting this. A total of 26.32% respondents \((n = 5)\) reported that their NSSI behaviours had been severe enough to require they seek medical attention on one or more occasions.
Table 15

*Frequency of NSSI Methods*

<table>
<thead>
<tr>
<th>NSSI Behaviour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting</td>
<td>16</td>
<td>84.21</td>
</tr>
<tr>
<td>Burning with cigarette</td>
<td>4</td>
<td>21.05</td>
</tr>
<tr>
<td>Burning with lighter or match</td>
<td>6</td>
<td>31.58</td>
</tr>
<tr>
<td>Carving words into skin</td>
<td>6</td>
<td>31.58</td>
</tr>
<tr>
<td>Carving pictures into skin</td>
<td>5</td>
<td>26.32</td>
</tr>
<tr>
<td>Severe scratching</td>
<td>14</td>
<td>73.69</td>
</tr>
<tr>
<td>Biting</td>
<td>10</td>
<td>52.63</td>
</tr>
<tr>
<td>Rubbing sandpaper on skin</td>
<td>2</td>
<td>10.53</td>
</tr>
<tr>
<td>Dripping acid on skin</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Scrubbing skin with cleaning product</td>
<td>1</td>
<td>0.53</td>
</tr>
<tr>
<td>Sticking sharp objects into skin</td>
<td>8</td>
<td>42.11</td>
</tr>
<tr>
<td>Rubbing glass into skin</td>
<td>5</td>
<td>26.32</td>
</tr>
<tr>
<td>Breaking bones</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Banging head</td>
<td>8</td>
<td>42.11</td>
</tr>
<tr>
<td>Punching self</td>
<td>7</td>
<td>36.84</td>
</tr>
<tr>
<td>Preventing wounds from healing</td>
<td>10</td>
<td>52.36</td>
</tr>
<tr>
<td>Other forms of non-suicidal self-injury</td>
<td>8</td>
<td>42.11</td>
</tr>
</tbody>
</table>

Participants varied in their reports of the age they first engaged in NSSI behaviours. The youngest reported age was five, however, this was an outlier. Table 16 below displays the average age of first use for each of the 17 NSSI behaviours recorded by the DSHI. It can be seen here that participants typically reported that they first engaged in NSSI behaviours during adolescence.
Table 16

Average age of first use of NSSI method

<table>
<thead>
<tr>
<th>Method</th>
<th>Mean Age</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting</td>
<td>15.19</td>
<td>2.56</td>
</tr>
<tr>
<td>Burning with cigarette</td>
<td>20.25</td>
<td>4.99</td>
</tr>
<tr>
<td>Burning with lighter or match</td>
<td>16.33</td>
<td>2.58</td>
</tr>
<tr>
<td>Carving words into skin</td>
<td>14.17</td>
<td>3.49</td>
</tr>
<tr>
<td>Carving pictures into skin</td>
<td>16.60</td>
<td>1.52</td>
</tr>
<tr>
<td>Severe scratching</td>
<td>14.43</td>
<td>3.55</td>
</tr>
<tr>
<td>Biting</td>
<td>13</td>
<td>5.60</td>
</tr>
<tr>
<td>Rubbing sandpaper on skin</td>
<td>15</td>
<td>4.42</td>
</tr>
<tr>
<td>Dripping acid on skin</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Scrubbing skin with cleaning product</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Sticking sharp objects into skin</td>
<td>13.38</td>
<td>3.07</td>
</tr>
<tr>
<td>Rubbing glass into skin</td>
<td>16.75</td>
<td>1.26</td>
</tr>
<tr>
<td>Breaking bones</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Banging head</td>
<td>13.29</td>
<td>5.02</td>
</tr>
<tr>
<td>Punching self</td>
<td>16.25</td>
<td>4.77</td>
</tr>
<tr>
<td>Preventing wounds from healing</td>
<td>13.80</td>
<td>4.34</td>
</tr>
<tr>
<td>Other forms of non-suicidal self-injury</td>
<td>15.38</td>
<td>2.39</td>
</tr>
</tbody>
</table>

6.4.2.2 Baseline measures.

The means, standard deviations, and possible ranges for the baseline measures in the current study are displayed in Table 17 below. Significance values and Cohen’s \(d\) effect size estimates for the between group differences are also reported in this table. Compared to those in the Non-NSSI group, respondents in the NSSI group reported significantly higher levels of Attachment Anxiety, Attachment Avoidance, and Alexithymia. Significantly higher scores for Emotion Regulation revealed that participants in the NSSI group also, on average, reported greater difficulties regulating their emotions. These findings are consistent with Study 1.
Table 17

**Descriptive Statistics For Baseline Measures**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
<th>P-Value</th>
<th>Effect Size (Cohen’s d)</th>
<th>Possible Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment Avoidance</td>
<td>NSSI</td>
<td>3.59</td>
<td>0.78</td>
<td>.000</td>
<td>1.34</td>
<td>1-7</td>
</tr>
<tr>
<td></td>
<td>Non-NSSI</td>
<td>2.60</td>
<td>0.69</td>
<td></td>
<td></td>
<td>1-7</td>
</tr>
<tr>
<td>Attachment Anxiety</td>
<td>NSSI</td>
<td>3.13</td>
<td>1.36</td>
<td>.001</td>
<td>1.08</td>
<td>1-7</td>
</tr>
<tr>
<td></td>
<td>Non-NSSI</td>
<td>1.99</td>
<td>0.63</td>
<td></td>
<td></td>
<td>1-7</td>
</tr>
<tr>
<td>Emotion Regulation</td>
<td>NSSI</td>
<td>129.05</td>
<td>28.57</td>
<td>.000</td>
<td>1.99</td>
<td>36-180</td>
</tr>
<tr>
<td></td>
<td>Non-NSSI</td>
<td>79.33</td>
<td>20.68</td>
<td></td>
<td></td>
<td>36-180</td>
</tr>
<tr>
<td>Alexithymia</td>
<td>NSSI</td>
<td>59.80</td>
<td>12.99</td>
<td>.000</td>
<td>1.37</td>
<td>20-100</td>
</tr>
<tr>
<td></td>
<td>Non-NSSI</td>
<td>44.09</td>
<td>9.76</td>
<td></td>
<td></td>
<td>20-100</td>
</tr>
</tbody>
</table>

**6.4.3 Multilevel Modeling Analyses**

**6.4.3.1 Model 1: Hypothesis 1 and 2**

As described in the Data Analytic Strategy subsection above, a series of three-level MLMs were used to assess whether individuals differed with regard to their experiences of affect over time, and whether this difference could be accounted for by group membership (NSSI versus Non-NSSI), emotion dysregulation, alexithymia, and attachment-related anxiety and avoidance.

When initially modelled as random effects, it was found that there was significant individual variability in experiences of activated negative affect, $\chi^2 (102) = 212.01, p < .001$, activated positive affect, $\chi^2 (102) = 217.53, p < .001$, deactivated negative affect, $\chi^2 (102) = 203.68, p < .001$, and deactivated positive affect, $\chi^2 (102) = 271.40, p < .001$.

As displayed in Table 18 below, a range of Level 3 predictors could explain this individual variance. Individuals with greater difficulties in emotion regulation reported, on average, higher levels of negative affect (both activated and deactivated) and lower levels of positive affect (both activated and deactivated). Respondents with higher levels of attachment-related avoidance tended to experience greater activated negative affect, but the fixed effects were not statistically significant across other
affect domains. Participants with higher levels of attachment-related anxiety reported, on average, higher levels of negative affect (both activated and deactivated), but there was no significant fixed effect for positive affect domains. In addition to this, those with higher levels of alexithymia reported, on average, greater negative affect (both activated and deactivated) and lower levels of positive affect (both activated and deactivated). Finally, the first hypothesis was supported in that individuals in the NSSI group reported, on average, higher levels of negative affect (across both activated and deactivated domains) and lower levels of positive affect (both activated and deactivated), compared to those in the Non-NSSI group.

Table 18

MLM Results Indicating the Role of Baseline Variables for Explaining Individual Differences in Experiences of Domains of Positive and Negative Affect

<table>
<thead>
<tr>
<th>Between Individual Effects</th>
<th>Predictors</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>$t$-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activated Negative Affect</td>
<td>NSSI grouping</td>
<td>1.11</td>
<td>0.34</td>
<td>3.31***</td>
</tr>
<tr>
<td></td>
<td>Emotion Regulation</td>
<td>0.02</td>
<td>0.01</td>
<td>3.94***</td>
</tr>
<tr>
<td></td>
<td>Attachment Avoidance</td>
<td>0.04</td>
<td>0.02</td>
<td>2.72**</td>
</tr>
<tr>
<td></td>
<td>Attachment Anxiety</td>
<td>0.47</td>
<td>0.24</td>
<td>1.93*</td>
</tr>
<tr>
<td></td>
<td>Alexithymia</td>
<td>0.44</td>
<td>0.16</td>
<td>2.78**</td>
</tr>
<tr>
<td>Activated Positive Affect</td>
<td>NSSI grouping</td>
<td>-1.30</td>
<td>0.37</td>
<td>-3.54**</td>
</tr>
<tr>
<td></td>
<td>Emotion Regulation</td>
<td>-0.02</td>
<td>0.00</td>
<td>-4.93**</td>
</tr>
<tr>
<td></td>
<td>Attachment Avoidance</td>
<td>-0.12</td>
<td>0.25</td>
<td>-0.48</td>
</tr>
<tr>
<td></td>
<td>Attachment Anxiety</td>
<td>-0.29</td>
<td>0.15</td>
<td>-1.95</td>
</tr>
<tr>
<td></td>
<td>Alexithymia</td>
<td>-0.05</td>
<td>0.01</td>
<td>-4.02**</td>
</tr>
<tr>
<td>Deactivated Negative Affect</td>
<td>NSSI grouping</td>
<td>1.52</td>
<td>0.44</td>
<td>3.49**</td>
</tr>
<tr>
<td></td>
<td>Emotion Regulation</td>
<td>0.03</td>
<td>0.01</td>
<td>5.19**</td>
</tr>
<tr>
<td></td>
<td>Attachment Avoidance</td>
<td>0.12</td>
<td>0.34</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>Attachment Anxiety</td>
<td>0.52</td>
<td>0.23</td>
<td>2.24*</td>
</tr>
<tr>
<td></td>
<td>Alexithymia</td>
<td>0.07</td>
<td>0.01</td>
<td>5.50**</td>
</tr>
<tr>
<td>Deactivated Positive Affect</td>
<td>NSSI grouping</td>
<td>-1.57</td>
<td>0.47</td>
<td>-3.37**</td>
</tr>
<tr>
<td></td>
<td>Emotion Regulation</td>
<td>-0.03</td>
<td>0.01</td>
<td>-4.27**</td>
</tr>
<tr>
<td></td>
<td>Attachment Avoidance</td>
<td>-0.24</td>
<td>0.39</td>
<td>-0.61</td>
</tr>
<tr>
<td></td>
<td>Attachment Anxiety</td>
<td>-0.40</td>
<td>0.24</td>
<td>-0.10</td>
</tr>
<tr>
<td></td>
<td>Alexithymia</td>
<td>-0.06</td>
<td>0.02</td>
<td>-3.42**</td>
</tr>
</tbody>
</table>

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

In order to assess whether individuals in the NSSI and Non-NSSI groups differed in the degree to which their emotions fluctuated over time, the ICC values
were computed for each group (see Table 19 below). In the case of the current data, overlapping 95% confidence intervals indicate that groups do not differ significantly from one another at the $p < .01$ level (Cumming & Finch, 2005). Table 19 reveals that data is largely consistent with the second hypothesis, in that compared to those in the Non-NSSI group, participants in the NSSI group demonstrated significantly greater variability in mood across days, in three of the four domains of affect (activated negative, deactivated negative, and deactivated positive). Taken with the previous results, participants in the NSSI group tended to fluctuate at a higher level of negative affect compared to those in the Non-NSSI group.

Table 19

<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>ICC value (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activated Positive Affect</td>
<td>NSSI</td>
<td>0.21 (0.19 – 0.23)</td>
</tr>
<tr>
<td></td>
<td>Non-NSSI</td>
<td>0.21 (0.20 – 0.23)</td>
</tr>
<tr>
<td>Deactivated Positive Affect</td>
<td>NSSI</td>
<td>0.36 (0.34 – 0.38)</td>
</tr>
<tr>
<td></td>
<td>Non-NSSI</td>
<td>0.21 (0.20 – 0.23)</td>
</tr>
<tr>
<td>Activated Negative Affect</td>
<td>NSSI</td>
<td>0.24 (0.22 – 0.26)</td>
</tr>
<tr>
<td></td>
<td>Non-NSSI</td>
<td>0.14 (0.13 – 0.15)</td>
</tr>
<tr>
<td>Deactivated Negative Affect</td>
<td>NSSI</td>
<td>0.25 (0.23 – 0.27)</td>
</tr>
<tr>
<td></td>
<td>Non-NSSI</td>
<td>0.16 (0.15 – 0.17)</td>
</tr>
</tbody>
</table>

6.4.3.2 Model 2: Hypothesis 3

In order to assess whether individuals in the NSSI and Non-NSSI group differed in the amount they reported specific coping strategies, a two level multilevel analysis was performed. On average, as stated in the third hypothesis, participants in the NSSI group were significantly less likely to report the use of engagement coping strategies compared to those in the Non-NSSI group, $t (37) = -3.69, p < .001$. There was no significant difference, however, in the use of disengagement coping across the two groups, $t (37) = -0.47, p = 0.32$. 
6.4.3.3 Model 3: Hypothesis 4 and 5

In order to assess whether the type of coping strategy utilised by participants in response to negative affect predicted a change in negative affect over time, a series of two-level MLMs were performed. As described in the Data Analytic Strategy subsection, analyses were repeated for five different time lags.

Figure 8 below displays the trends for the fixed effects for the Level 1 relationship between coping and negative affect. Overall, there was partial support for the fourth hypothesis. Reported use of engagement coping at Time 0 tended to lead to a decrease in negative affect at Time 1, and increase in negative affect at Time 2, a decrease in negative affect at Time 3 and Time 4, and an increase in negative affect at Time 5. These relationships were not, however, statistically significant at Time 1, \( t(2165) = -1.02, p = 0.15 \), Time 2, \( t(2127) = 0.65, p = 0.26 \), Time 3, \( t(2089) = -0.93, p = 0.18 \), Time 4, \( t(2051) = -0.03, p = 0.49 \), and Time 5, \( t(2013) = 0.68, p = 0.25 \). Findings suggest that use of engagement coping did not reliably predict a change in negative affect for all participants.

Reported use of disengagement coping at Time 0 tended to lead to an increase in negative affect at Time 1, Time 2, and Time 3, and a decrease in negative affect at Time 4 and Time 5. The fixed effects for the relationship between disengagement coping and negative affect were statistically nonsignificant at Time 1, \( t(2165) = 0.32, p = 0.38 \), Time 3, \( t(2089) = 0.59, p = 0.28 \), Time 4, \( t(2051) = -0.70, p = 0.18 \), and Time 5, \( t(2013) = -0.08, p = 0.47 \). The use of disengagement coping at Time 0 did, however, lead to a statistically significant increase in negative affect at Time 2, \( t(2127) = 1.82, p < .05 \). This finding suggests that disengagement coping led to an increase in negative mood, but that this effect was delayed.
When modelled as random effects, it was found that there was a significant amount of individual variability in the relationship between reported engagement coping at Time 0 and negative affect at Time 1, \( t(37) = 3.21, p < .001 \), Time 2, \( t(37) = 2.34, p < .01 \), Time 3, \( t(37) = 1.84, p < .05 \), Time 4, \( t(37) = 2.09, p < .05 \), and Time 5, \( t(37) = 2.18, p < .05 \). Similarly, there were also significant random effects for the association between disengagement coping at Time 0 and negative affect at Time 1, \( t(37) = 2.94, p < .01 \), Time 2, \( t(37) = 2.82, p < .01 \), Time 3, \( t(37) = 2.07, p < .05 \), and Time 5, \( t(37) = 2.42, p < .01 \). There was not a significant random effect for the relationship between disengagement coping and negative affect at Time 4, \( t(37) = 1.62, p = 0.05 \). Taken together, these findings suggest that there was a significant amount of individual variability in the relationship between coping strategies and negative affect over time. This indicates that variations in reported coping strategies led to changes in negative affect for some (but not all) participants, and that other factors may be important. Given this finding, baseline measures (NSSI, Emotion Regulation, Alexithymia, Attachment Avoidance, and Attachment Anxiety) were
included at Level 2 to determine the influence of these variables on the relationship between coping and negative affect. The findings are displayed in Table 20 below.

In general, the random effects were poorly predicted by baseline variables included at Level 2. There were, however, a few exceptions. At Time 1, Attachment Anxiety moderated the relationship between engagement coping and negative affect. Findings indicated that a one-unit increase in Attachment Avoidance led to a reduction of 0.52 in the Level 1 fixed effect between engagement coping and negative affect. This suggests that reported engagement coping generally led to a decrease in negative affect at Time 1, but that this relationship was weaker for those with higher rates of attachment-related avoidance. At Time 2 NSSI grouping was a significant Level 2 predictor for the relationship between engagement coping and negative affect. A one-unit increase in NSSI (i.e. moving from the Non-NSSI group to the NSSI group) produced a reduction of 1.00 in the Level 1 fixed effect. As such, engagement coping at Time 0 led to an increase in negative affect at Time 2, but this relationship was weaker for those in the NSSI group. Alexithymia and Attachment Anxiety also explained some of the individual variability in the relationship between disengagement coping and negative affect at Time 2. Specifically, disengagement coping at Time 0 led to an increase in negative affect at Time 2, however this relationship was weaker for those who reported higher rates of Alexithymia and Attachment Anxiety. This trend was maintained at the subsequent time point, whereby disengagement coping led to an increase in negative affect at Time 3, with this relationship weakened as Alexithymia and Attachment Anxiety increased. At Time 5, Alexithymia explained individual variability in the positive relationship between engagement coping and negative mood. These findings suggest that engagement
coping at Time 0 was associated with increased negative affect at Time 5, but that this relationship was less significant for those with higher rates of Alexithymia.
### Table 20
**Baseline Variables Predicting the Relationship Between Negative Mood and Coping**

<table>
<thead>
<tr>
<th>Time Lag</th>
<th>Predictor</th>
<th>Coping</th>
<th>Coefficient</th>
<th>SE</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NSSI</td>
<td>Disengagement</td>
<td>-0.40</td>
<td>0.67</td>
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* * p < .05, ** p < .01
6.5 Discussion

Existing research suggests that individuals engaging in NSSI may differ from those without a history of NSSI in their ability to regulate emotions and the strategies they employ to cope with distress. Despite advances in psychological research examining the processes of emotions and coping in the development and maintenance of NSSI, there are limitations with the extant empirical literature, with the vast majority of existing studies relying on cross-sectional methodology that cannot determine causality and retrospective self-report measures that may be prone to bias. Building on the foundations of the cross-sectional survey in Study 1, which revealed that specific attachment relationships and the ability to effectively identify, process, and cope with emotions may be important in predicting history of NSSI behaviours, Study 2 aimed to explore changes in affect and coping strategies using EMA technology. Three research questions were initially posed:

RQ1: Do individuals differ in terms of moment-to-moment experiences of dimensions of negative and positive affect over time? If so, can this difference be explained by group membership (NSSI versus Non-NSSI), emotion regulation, alexithymia, and/or attachment-related anxiety and avoidance?

RQ2: Is group membership (NSSI versus non-NSSI) predictive or related to the type of coping strategies individuals employ to manage negative affect?

RQ3: Do reported coping strategies differ with regard to their effectiveness in reducing negative affect over time?
As outlined in section 6.2, five hypotheses were developed in line with the available theoretical and empirical literature. First, it was hypothesised that, compared to individuals in the Non-NSSI group, participants in the NSSI group would report more frequent negative affect and less frequent positive affect over time (H1). Second, it was hypothesised that respondents in the NSSI group would report greater fluctuations in affect over time, compared to those in the Non-NSSI group (H2). Third, it was hypothesised that, when experiencing negative affect, participants in the NSSI group would more frequently report the use of disengagement or avoidant coping strategies, and respondents in the Non-NSSI group would more frequently report the use of engagement or problem-focused coping strategies (H3). Fourth, it was hypothesised that engagement coping would lead to a reduction in negative affect over time, and disengagement coping would lead to an increase in negative affect over time. (H4). Finally, it was hypothesised that the effectiveness of engagement and disengagement coping would be moderated by trait level and background variables (including history of NSSI, and baseline emotion regulation skills, alexithymia, and attachment-related anxiety and avoidance) (H5).

EMA methodology was used to test the five hypotheses outlined above. Initially, participants completed a series of self-report measures to provide baseline scores for emotion regulation, attachment, and alexithymia, and obtain information regarding NSSI history. Following this, participants used their mobile phones to complete a questionnaire assessing moment-to-moment affect and coping five times per day for a period of 14 days. Data analysis involved MLM procedures, with three models developed to test the aforementioned hypotheses.

A total of 38 university students engaged in the study. The average age of respondents was 22.21, and the majority of participants were women ($n = 89.47\%$). In
total, 50% reported a history of NSSI, and all of these respondents had engaged in
NSSI within the past five months. Consistent with Study 1, most participants in the
NSSI group reported that they had engaged in multiple forms of NSSI, but self-
laceration or cutting was the most common method. Participants typically reported
that they first engaged in NSSI behaviours during adolescence, which is also
congruent with the first study. Of those in the NSSI group, 26.32% of respondents
reported that they had engaged in NSSI severe enough to require they seek medical
attention. Compared to those in the Non-NSSI group, those with a history of NSSI
reported significantly higher levels of attachment avoidance, attachment anxiety, and
alexithymia, as well as greater difficulties regulating their emotions.

Overall, the data provided mixed support for the hypotheses developed at the
onset of the project. Hypothesis 1 and Hypothesis 2 were supported. There was mixed
findings for Hypothesis 3 and Hypothesis 4, and very limited support for Hypothesis
5. Findings associated with each hypothesis are summarised and discussed below in
relation to past research and theory. Following this, the implications of findings for
research and clinical practice are discussed, as well as the shortcomings or limitations
of the study and directions for future research.

### 6.5.1 Hypothesis 1 and 2

The current study found support for the prediction that participants in the
NSSI group would report more frequent negative affect and less frequent positive
affect compared to those in the Non-NSSI group (H1). MLM analysis revealed that
there was significant individual variability in experiences of negative and positive
affect, and that this difference could be explained by differences in NSSI grouping.
Individuals in the NSSI group reported, on average, higher levels of activated and
deactivated negative affect and lower levels of activated and deactivated positive affect, compared to participants in the Non-NSSI group. The current study also found support for the hypothesis that respondents in the NSSI group would report greater fluctuations in affect over time (H2). MLM analyses revealed that, compared to those in the Non-NSSI group, participants in the NSSI group demonstrated significantly greater variability in mood across moments and days, in three of the four domains of affect – activated negative, deactivated negative, and deactivated positive. Taken together, these results suggest that individuals with a recent history of NSSI tend to experience and fluctuate at higher levels of negative affect than those with no history of NSSI.

This finding is consistent with past cross-sectional research. In a study of college students in the United States, researchers Brown, Williams and Collins (2007) reported that, compared to participants without a history of NSSI, individuals with a recent history of NSSI reported higher levels of negative emotions during a single administration of the Positive and Negative Affect Schedule-Expanded Form (PANAS-X; Watson & Clark, 1994). The individual difference observed for the activated negative affect domain (which encompassed aggravated, agitated, hostile, and upset emotions), also supports findings by previous cross-sectional studies that have shown that those who engage in NSSI tend to have greater levels of anger and hostility compared to comparison groups (Brunner et al., 2007; Ross & Heath, 2003; Simeon et al., 1992). It might also be argued that these findings (with a particular focus on reported experiences of deactivated negative affect) are somewhat consistent with previous cross-sectional findings that show NSSI is associated with depressive symptoms (Boudewyn & Liem, 1995; Brown & Williams, 2007; Brunner et al., 2007; Crowell et al., 2005; Fleige et al., 2006; Klonsky, Oltmans, & Turkheimer, 2003).
Lastly, there are studies to support the idea that higher levels of fluctuating negative affect can be seen in individuals with BPD, which NSSI is a symptom of (Hoschild Tolpin, Cimbolic Gunthert, Cohen, & O’Neill, 2004).

The current study adds to the extant literature by utilising EMA methodology that has strong ecological validity, and reduces the likelihood of recall bias compared to traditional data collection methods (Reise, Erber, & Gilmour, 1994). The significant difference between NSSI and Non-NSSI groups in levels of affect across the two week time period adds confirmatory evidence to the notion that individuals with a recent history of NSSI tend to experience higher levels of negative affect and less positive affect in their day-to-day lives, regardless of whether or not they have engaged in NSSI over this period. It may be that, compared to the Non-NSSI group, those in the NSSI group (a) more consistently report negative in general, (b) become more easily distressed by daily events, (c) have fewer and/or less effective skills to manage negative affect, and/or (d) experience regular coping skills as less effective in the face of strong negative affect. When considering the function of NSSI, a tendency to experience higher levels of negative affect may explain why individuals engage in NSSI behaviours (Armey, Crowther, & Miller, 2011; Meuhlenkamp et al., 2009), suggesting that this may be somewhat of a risk factor for further self-injury.

In addition to the finding that experiences of affect differed as a function of NSSI group membership, it was revealed that baseline scores for emotion regulation and alexithymia also predicted individual differences in affect. Participants with higher levels of alexithymia and emotion dysregulation reported, on average, greater negative affect (both activated and deactivated domains) and lower levels of positive affect (both activated and deactivated domains). These findings are largely consistent with what one would expect, namely that those who have difficulty identifying,
processing, and managing emotions are likely to experience greater distress over time.

While adaptive emotion regulation is not simply synonymous with reduced negative affect and/or increased positive affect (Gratz & Roemer, 2004; Thompson, 1994), difficulty regulating emotions has been associated with depressive symptoms and other forms of psychopathology (Cole & Hall, 2012; Joormann & Gotlib, 2010).

Respondents with higher levels of attachment-related avoidance tended to experience more frequent activated negative affect, and those with higher levels of attachment-related anxiety tended to experience both greater activated and deactivated negative affect. This finding is consistent with previous studies that suggest that attachment insecurities (both avoidance and anxiety) are associated with deteriorated wellbeing and heightened distress (Berant, Mikulincer, & Florian, 2001; Mikulincer & Florian, 1998; Mikulincer, Florian, & Weller, 1993). Theoretically, individuals who are high on anxious attachment may learn to sustain or intensify negative emotions because they perceive them as congruent with their attachment goals (Cassidy, 1994; Mikulincer & Shaver, 2007). Mikulincer and Shaver (2007) explain that anxiously attached individuals tend to maintain negative affect through cognitive processes such as “making catastrophic appraisals, amplifying the threatening aspects of even minor troubles, maintaining pessimistic beliefs about one’s inability to manage distress, and attributing threatening events to uncontrollable causes and global personal inadequacies” (p 194). These authors also explain that high levels of attachment-related avoidance can also lead to increased negative affect, whereby prevention of experience and expression of emotions may lead to ineffective information processing and social behaviour in response to stressors, which in turn is likely to lead to distress in the long-term. This is consistent with authors who posit that attempts to suppress or avoid negative emotions may lead to greater distress (Gross & John, 2003; Hayes,
Strosahl, & Wilson, 1999). This set of findings is consistent with results from Study 1, demonstrating further support for the notion that attachment insecurity can lead to poor emotion regulation and higher levels of distress.

Overall, self-injurers reported higher levels of fluctuating negative affect than those in the Non-NSSI group. Further, respondents in the NSSI group experienced higher levels of emotion dysregulation, attachment-related anxiety, and attachment-related avoidance, which in turn were shown to be associated with greater levels of negative affect and lower levels of positive affect. While negative affect may not, in itself, be a detrimental or damaging experience, research has demonstrated that NSSI is precipitated by high levels of negative affect (Armey, Crowther, Miller, 2011; Meuhlenkamp et al., 2009), which suggests that there are concerns with tolerating distress and/or adaptively regulating strong negative affect. In working with people who engage in NSSI in clinical settings then, it appears important to develop ways of understanding, experiencing, tolerating, and ameliorating intense negative affect in ways that are validating, practical, and realistic.

6.5.2 Hypothesis 3

Data from the current study found partial support for the hypothesis that participants in the NSSI group would more frequently report the use of disengagement or avoidant coping strategies and that respondents in the Non-NSSI group would more frequently report the use of engagement or problem-focused coping strategies (H3). On average, participants in the NSSI group were significantly less likely to report use of engagement coping strategies when faced with distress compared to those in the Non-NSSI group. There was, however, no significant difference in the use of disengagement coping across the two groups.
Results from the current research provide support for findings from cross-sectional studies that suggest that those with a tendency to engage in NSSI report less problem-focused or engagement coping compared to comparison groups (Andover, Pepper, & Gibb, 2007; Cawood & Hubrich, 2011; Dear, Slattery, & Hillan, 2001; Hasking et al., 2010). Findings appear, however, to contradict authors who have found that NSSI is associated with greater emotion-focused and/or disengagement coping (Andover, et al., 2007; Cawood & Hubrich, 2011; Williams & Hasking, 2010).

One way of explaining these unexpected results relates to episodes of NSSI during the study. Whilst a few individuals ($n = 5$) reported that they self-injured while they were participating in the study, the majority (73.68%) of those in the NSSI group did not. It may be that most respondents did not experience significant stressors within the two weeks that may have activated them to a distressed state where they may have employed NSSI. That is, while those in the NSSI group experienced more frequent negative affect as a baseline and implemented less engagement coping generally, when faced with high valence psychosocial stressors their disengagement and/or emotion-focused coping may increase also, and/or they may just resort to NSSI straight away.

Inconsistencies in findings may also be explained with reference to theory. Authors such as Lazarus and his colleagues (Folkman & Lazarus, 1980; Lazarus, 1991; Lazarus & Folkman, 1984) reason that there is not necessarily one form of coping that is inherently more adaptive than the rest. Instead, it may be argued that effective coping involves being able to employ strategies flexibly and as appropriate to the context (Cole, Michel, & Teti; Gratz & Roemer, 2004; Thomson, 1994). Findings from the current study indicate that respondents in the NSSI group were less likely to report the use of engagement coping strategies, which suggests that they had
fewer “go to” coping strategies and may be less likely to apply such strategies flexibly as appropriate to various stressors. While those in the NSSI group utilized engagement coping less frequently than disengagement coping, those in the Non-NSSI group employed a broad range of both, which may theoretically be more adaptive. This is consistent with findings from Study 1, which suggested that individuals with a history of NSSI had limited access to emotion regulation strategies, compared to those without a history of NSSI. This proposed inflexibility might partially explain why individuals in the NSSI group tended to experience greater negative affect, as discussed earlier. The reduced range and/or compromised ability of those with NSSI behaviours to apply a variety of coping strategies at times of distress indicates that increasing these skills could be an important clinical target for assisting people who self-injure, as suggested by previous authors such as Newman (2009).

6.5.3 Hypothesis 4

There was mixed support for the hypothesis that engagement coping would lead to a reduction in negative affect over time and that disengagement coping would lead to an increase in negative affect over time (H4). Figure 6, section 6.4.3.3, displays a graph of the trends for the relationship between coping and negative affect over time. Fixed effects were mostly not statistically significant, suggesting that coping did not reliably predict a change in negative affect for all individuals. Disengagement coping did, however, lead to an increase in negative affect at the second time point. At other time points, it was observed that there was significant individual variability in the relationship between coping and resulting negative affect – suggesting that use of particular coping strategies did influence mood for some (but not all) individuals in the study.
Findings revealed that disengagement coping did lead to an increase in negative affect at Time 2. This indicates that disengagement coping did not immediately result in a reliable change in affect, but that there was an increase in negative affect in the slightly longer-term (three or more hours after reporting a plan to implement disengagement coping). Disengagement coping included the following strategies: problem avoidance, wishful thinking, self-criticism, and social withdrawal. As specified in section 6.4.1.4, however, the vast majority of responses included in this category were reports of problem avoidance ($n = 93.83\%$), which makes it difficult to generalise findings to the other forms of disengagement coping included in the model. With this in mind, findings are consistent with theorists who suggest that strategies such as avoidance or distraction of emotions or stressors may not be problematic or harmful in the short-term, but may lead to greater distress in the longer-term (Hayes, Strosahl, & Wilson, 1999). Clinically, this suggests that assisting individuals to acknowledge and engage with distress and then implement problem-solving where appropriate may lead to decreased negative affect over time, which may act to protect against episodes of NSSI.

The negative impact of problem avoidance was apparently not, however, maintained over time, and the relationship between disengagement coping and negative affect became weaker. While this is contrary to what was originally hypothesised, there are a number of ways this may be explained. With the final time point measured, at minimum, 7.5 hours after participants reported a plan to implement a coping strategy, it may be that other extraneous variables impacted upon later reports of negative affect. While the analysis controlled for the effect of time on the relationship between the measured variables, changes in affect may be influenced by factors such as the development of new stressors, a change in circumstances for
respondents, or decisions to use alternative coping strategies from what was originally reported. In addition to this, although reports of negative affect were evenly spread across the course of the day between 9.00 am and 9.30 pm (the variable reflecting time of the day was normally distributed) time points were separated by sleep in some cases, which may have also impacted upon changes in negative affect.

As discussed earlier, coping theory incorporates the notion that styles of coping differ in terms of their suitability and utility across situations (Lazarus, 1991). For instance, although skills in problem-focused coping have been associated with greater mental health outcomes (Compas, Orosan, & Grant, 1993), it can be argued that attempting to actively solve problems may not always be helpful or suitable in situations where a stressor is objectively out of an individual’s control. In such cases, engaging in strategies such as distraction may be necessary. Given this, changes in positive and negative affect on the basis of which coping strategy is used is likely to be moderated by it appropriateness to the context and the manner in which it is implemented, rather than a simple linear relationship between problem-focussed coping and improved affect. This may explain why engagement coping did not universally lead to a decrease in negative affect for all individuals and/or why the adverse impact of disengagement coping was not maintained over time.

6.5.4 Hypothesis 5

There was very little support for the hypothesis that the effectiveness of coping strategies would be moderated by variables measured at baseline (H5). As explained above, there was significant individual variability in the relationship between coping and negative affect, suggesting that other factors may influence this association. In general, however, baseline variables in the current study were poor
predictors of this individual variability. This suggests that other factors that were not included in the study are important to understanding the relationship between coping and negative affect. The few significant findings are summarised and discussed below.

At the first measurement point, it was observed that attachment-related avoidance moderated the relationship between engagement coping and negative affect. Specifically, engagement coping was less effective in reducing negative affect when participants reported higher attachment-related avoidance. As previous authors have discussed (Mikulincer & Shaver, 2007), individuals who are high on attachment avoidance do not tend to seek support from others when they are in need, and attempt to prevent the expression of emotions. As social support seeking and the expression of emotions can be a component of adaptive engagement coping (Tobin, Holroyd, Reynolds, & Wigal, 1989), efforts to avoid these may mean that engagement coping is less effective in reducing negative affect in individuals with higher levels of attachment avoidance.

Results revealed that engagement coping led to an increase in negative affect at the second time point for some (but not all) individuals. This was less likely to be the case for participants in the NSSI group. As discussed above, participants in the NSSI group were significantly less likely to report the use of engagement strategies. Results suggest, however, that when they did they were more likely to receive greater benefits in terms of reducing negative affect, than those in the Non-NSSI group. The finding that engagement coping led to an increase in negative affect for some individuals is not what the current authors expected. It may be, however, that engaging with a problem or stressor may be initially distressing for some individuals. It is also possible then that initial distress associated with engagement coping may
lead to problem avoidance in individuals who become overwhelmed. As discussed above, it also appears important to consider the appropriateness of coping strategies to specific situations, and it may be that engagement coping – which mostly comprised reports of problem-solving ($n = 78.34\%$) – may lead to greater distress when utilized inappropriately or ineffectively.

Finally, disengagement coping generally led to an increase in negative affect, but this relationship was weaker for individuals who reported higher rates of attachment-related anxiety and alexithymia. Individuals who are higher on alexithymia tend to have difficulty recognising distress and differentiating between emotions (Taylor, 2004). While the current study found that alexithymia was associated with higher frequencies of negative affect, it may be that the relationship between disengagement coping and negative affect appeared weaker for these individuals because of difficulties identifying and reporting these emotions during the study. Attachment anxiety is categorised by heightened emotions, excessive support seeking, and fear of rejection and abandonment (Shaver & Mikulincer, 2009). As outlined earlier, frequency of negative affect increased as attachment-related anxiety increased, but it is unclear to the current authors why individuals with high attachment anxiety would be less prone to experience negative affect after the use of disengagement coping. One explanation is that attempts to avoid a problem may be less problematic for individuals who tend to intensify their experiences of distressing emotions and seek help and proximity to others to an extent that is considered excessive. In addition to this, if a stressor relates to an interpersonal problem, avoiding or disengaging from it may de-escalate the difficulty in those prone to fear of abandonment and rejection, rather than increasing anxiety and distress. This may be adaptive in the short-term in certain relationship contexts.
6.5.5 Limitations of the Current Study

There are some shortcomings of the current study that should be considered when interpreting the results. For example, the sample size was small, predominantly female (\(n = 89.47\%\)) and young adult, and was comprised solely of university students, which limits the ability for findings to be generalised to the broader population. In addition to this, there is likely to be further selection bias as a result of the fact that the study only included individuals who were willing to participate in the somewhat time-consuming and demanding research protocol.

There are also concerns with the methodology of the current study that make it difficult to ascertain the true nature of the relationship between coping and negative affect. Specifically, while participants were asked to specify what they were planning to do to manage negative emotions, the EMA questionnaire did not measure whether or not participants actually applied the coping strategy they reported. Data collection procedures did not account for the fact that participants may have altered their coping strategies after responding to the questionnaire. Furthermore, it is important to note that latency data reflecting the delay between text message and participant response was not collected, which may threaten the validity of findings – although this was somewhat minimised within the analyses through controlling for time between responses.

Although the use of EMA methods reduces the likelihood of recall biases and increases the reliability and ecological validity of data (Hufford, 2007), it must be noted that the current study is still reliant on self-report measures. As discussed in relation to Study 1, reports may be influenced by factors such as one’s willingness to disclose information, as well as their insight or ability to accurately report on behaviours and experiences. In addition to this, given the repeated measures design of
the current study, data may be impacted by practice effects, with individuals completing the questionnaire somewhat automatically, without reflecting on their experiences and reporting them accurately. Despite these potential limitations, participants who engaged in the study were demonstrably motivated to take part in the required protocol, which was outlined clearly prior to the commencement of individual data collection.

Finally, this study did not control for the potential influence of mental illness on the current findings. As noted as a limitation of Study 1, it would be useful to know whether participants in both groups had mental health histories, or whether they had been diagnosed with a disorder such as depression, anxiety, or BPD. The presence of such psychopathology may have influenced results relating to reported affect and coping over time.

6.5.6 Concluding Remarks and Directions for Future Research

At the most basic level, the current study demonstrates that EMA methodology can be used to examine constructs associated with NSSI, as other authors have also recently demonstrated (Armey, Crowther, & Miller, 2011; Nock, Prinstein, & Serba, 2009). The current study provides previously unavailable information about the differences in experiences of affect and the effectiveness of coping strategies in university students with a recent history of NSSI compared to those without a history of NSSI.

The aforementioned limitations of the current study provide a basis for suggestions regarding the directions for future research. It is important for studies to use similar EMA methods to assess changes in affect and coping in a larger, more diverse sample of participants, including more males and those outside of university
cohorts. Further studies assessing the impact of coping strategies on negative affect may explore whether other factors not included in the current study may influence this relationship, such as psychopathology, help-seeking tendencies, or personality characteristics. Future research could also employ methodology that accounts for the fact that individuals may not engage in the coping strategies they plan to put in place, or for the potential delay between planning and implementing strategies.
Chapter 7: General Discussion

NSSI, or acts that involve intentional damage or destruction of tissue in the absence of suicidal intent, is a complex and concerning phenomenon that presents as a significant challenge for the health system in Western countries like Australia. With NSSI a potential risk factor for suicide (Jacobson, Meuhlenkamp, Miller, & Turner, 2008; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Owens & House, 2002), there is a need for empirical research that enables clinicians, community organisations, and governmental departments to understand the factors that lead to the development and maintenance of these maladaptive behaviours, and can inform the development and implementation of effective interventions. With this assertion, there has been a growth in the extant literature aimed at examining correlates and risk factors for NSSI, and a number of neurobiological, psychological, and interpersonal models have been developed. Nevertheless, research remains preliminary in many areas, and advancement has been inhibited by factors such as inconsistencies in classification systems, and the reliance on cross-sectional data and retrospective reports.

Of the constructs that have been put forward to explain NSSI, theories relating to attachment relationships, affect regulation, and coping, appear to hold significant promise. The current research project consisted of two separate, yet interrelated studies, pertaining to these variables. The first study sought to examine the broader relationships between constructs within attachment, emotion regulation, and NSSI behaviours, while the second study investigated moment-to-moment experiences of affect and coping in individuals with and without NSSI histories. Study 1 consisted of a cross-sectional survey study aimed at examining the associations between NSSI, six
facets of emotion regulation, alexithymia, and attachment-related anxiety and avoidance in four specific relationships. Study 2 utilised EMA methodologies for investigating moment-to-moment differences in the way individuals with and without a recent history of NSSI experience affect and manage distress.

7.1 Key Findings

Chapters 5 and 6 discuss the findings for each of these studies in detail, as well as their specific limitations and implications. Broadly speaking, however, the current research project confirms the importance of emotion regulation and attachment relationships in understanding NSSI. It appears that specific attachment relationships may be differentially important in predicting NSSI, with attachment-related anxiety with father and romantic partner shown to be unique predictors that may predispose an individual to NSSI behaviours. The current research project revealed that emotion regulation mediated the relationship between NSSI and attachment in specific relationships. While various facets of emotion regulation appeared important, it was shown that perceived access to strategies with which to regulate emotions may be most important in predicting NSSI, and it was found that this factor mediated the relationship between NSSI and other emotion regulation variables.

To examine this concept further, moment-to-moment experiences of affect regulation and coping in NSSI and Non-NSSI individuals were examined across a two week time period, with findings revealing significant differences in the way respondents experience emotions and deal with stress. While Study 1 demonstrated that the presence of NSSI could be predicted by and higher levels of emotion dysregulation, attachment insecurity, and alexithymia, Study 2 provided a potential explanation for this association, verifying that these variables were associated with
greater negative affect over time. The current project found that individuals with a recent history of NSSI tended to report higher rates of negative affect, less frequent positive affect, and greater fluctuations in emotions compared to the comparison group, over a two-week time period. These individuals also demonstrated differences in coping approaches, being less likely to report the use of engagement coping strategies. The current research demonstrated that while outcomes associated with regulation styles were not uniform across individuals, and other factors were likely to moderate the observed relationships, disengagement coping (which mostly included episodes of problem avoidance) was shown to increase negative affect over time.

Despite the limitations associated with each of these studies, which have been detailed in the respective discussion sections in the previous two chapters, the current empirical research is noteworthy for a number of reasons. This project is one of only a small number of studies to examine processes associated with NSSI using EMA methodology, which contributes to the current literature base by providing ecologically valid data that examines moment-to-moment changes in affect. Contributing to past theory and research that specifies that NSSI is precipitated by negative affect (Armey, Crowther, & Miller, 2011; Chapman, Gratz, & Brown, 2006; Muehlenkamp et al., 2009), the current project revealed that individuals with a recent history of NSSI tend to experience greater negative affect in their day-to-day lives regardless of their current engagement in NSSI. These studies highlight the importance of implementing effective strategies to regulate emotions and deal with stress, suggesting that this may protect individuals from engaging in NSSI behaviours through a reduction in extreme negative affect.
7.2 Future Research Suggestions

The current study demonstrates the utility of EMA methods for examining constructs associated with NSSI. Concerning future research, studies should assess changes in affect and coping in a large representative sample of participants, and investigate whether other factors influence this relationship. As recently shown by Armey (2012), future studies may wish to incorporate EMA technologies into intervention trials. One suggestion may be to use moment-to-moment assessment to determine whether (and how) established treatment approaches have an influence on the affect and emotion regulation variables discussed herein. It is also necessary for future research to investigate whether the theoretical models proposed in this project can be verified through longitudinal research methodology that can be used to establish causality.

7.3 Implications For Clinical Practice

The current project has several implications for clinical practice. Findings suggest that implementation of particular coping strategies may be important in predicting affect, but that there is a great deal of individual variability. Indeed, while disengagement coping (particularly problem avoidance) may increase negative affect, there does not appear to be one coping strategy that is uniformly helpful in terms of reducing negative affect over time. It appears that teaching individuals to engage in adaptive coping does not simply equate to encouraging active problem-solving or engagement, but that individuals may benefit from learning how best to appraise situations and apply coping strategies in a flexible manner. It also appears that other factors may impact on the relationship between coping and negative affect, indicating that in may be important for clinicians to consider underlying individual variables
when building skills in emotion regulation. Finally, it may be that individuals have knowledge of what may be helpful when faced with a stressor but either do not believe that they can implement engagement coping when aroused and/or begin to undertake an adaptive strategy but give up or abandon the activity when it does not work immediately. People may not only, therefore, require help in increasing their repertoire of coping skills, but they may need training in how to implement them in a sustained way while tolerating short-term distress. This is clinically similar to exposure and/or response prevention techniques undertaken with clients with anxiety disorders (see Abramowitz, Deacon, and Whiteside, 2011), as well as distress tolerance skills taught to those with BPD (see Linehan 1993b). It is also likely to be important to reinforce individuals’ perceived self-efficacy in relation to identifying and implementing emotion-regulation strategies. Fostering individuals’ perceived control and competence in this regard, by positively reinforcing their view of the self as being capable and highlighting previous successful attempts at emotion-regulation, may increase the likelihood of them internalising this as part of the self-concept, and therefore actively drawing on strategies that are taught, or that they have learnt previously.

Findings also indirectly support intervention protocols that emphasise a reduction in emotion dysregulation (such as Linehan 1993a, 1993b). Findings suggest that improving self-efficacy in the application of emotion regulation strategies may be an important target for clinical practice. As outlined by previous authors (such as Newman, 2009), this may involve challenging beliefs that there are no alternative methods of managing unpleasant emotions. Intervention to prevent or reduce the likelihood of NSSI may focus on facilitating awareness of internal experiences. With results suggesting that emotional awareness may be directly related to NSSI,
techniques such as mindfulness (which is a component of ‘third-wave’ approaches such as DBT and ACT) may be beneficial for improving non-judgmental awareness and facilitating emotion regulation (O’Brien, Larson, & Murrell, 2008), which may prevent or reduce NSSI. This also supports recently established ACT skill building groups for individuals with BPD who are prone to NSSI, such as those developed by Morton and Shaw (2012), suggesting that such an approach may be adapted for individuals with NSSI behaviours in the absence of further BPD traits.

Finally, although causality cannot be assumed from the first cross-sectional study, results suggest that NSSI behaviours and difficulties in emotion regulation areas may partially arise from insecure attachment styles in specific relationships. This may provide a basis for early intervention, with the assertion that improving children’s care environments and immediate attachment relationships may prevent the development of maladaptive behaviour patterns. Findings merge with the traditional practice of attending to attachment and relationship concerns for individuals affected by psychopathology (Bowlby, 1998; Brakemeier & Fraise, 2012; Klerman, Weissman, Rounsaville, & Chevron, 1984). It appears that paternal relationships may be important, and this could be the target of universal and selected mental health promotion programs, as well as improved systems of care and support in situations where abuse is occurring. This project also revealed that current romantic partner relationships are implicated in NSSI, and may be particularly influential for adolescents and young adults seeking to individuate from their caregivers. Findings support recent assertions by authors such as Jacobson and Mufson (2012) that interpersonal therapy (IPT) may be helpful for this cohort due to the suggestion that interpersonal stress appears to be a trigger for self-injurious acts. Assisting individuals to develop healthy relationships in adolescence and adulthood, perhaps through
targeted school programs, may support mental health in young people. Increasing interpersonal effectiveness and adaptive communication skills (as suggested by authors such as Linehan, 1993b) may reduce distress and protect against NSSI behaviours.
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Attachment Interview are associated with disrupted mother-infant


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Los Angeles, CA: Muthén & Muthén.

CA: Duxbury Press.


Appendix A: Ethics Approval

Human Research Ethics
Deakin Research Integrity
70 Eiger Road Burwood Victoria
Postal: 221 Burwood Highway
Burwood Victoria 3125 Australia
Telephone 03 9251 7123 Facsimile 03 9244 6581
research-ethics@deakin.edu.au

Memorandum

To: Dr Helen Mildred
   School of Psychology

B cc: Miss Manon Elise Burgat

From: Deakin University Human Research Ethics Committee (DUHREC)

Date: 19 December, 2011

Subject: 2011-243
   Psychosocial factors of non-suicidal self-injury: Attachment, emotion regulation, alexithymia
   and environmental stress
   Please quote this project number in all future communications

The application for this project was considered at the DU-HREC meeting held on 12/12/2011.

Approval has been given for Miss Manon Elise Burgat, under the supervision of Dr Helen Mildred, School of Psychology, to undertake this project from 19/12/2011 to 19/12/2015.

The approval given by the Deakin University Human Research Ethics Committee is given only for the project and for the period as stated in the approval. It is your responsibility to contact the Human Research Ethics Unit immediately should any of the following occur:

- Serious or unexpected adverse effects on the participants
- Any proposed changes in the protocol, including extensions of time.
- Any events which might affect the continuing ethical acceptability of the project.
- The project is discontinued before the expected date of completion.
- Modifications are requested by other HRECs.

In addition you will be required to report on the progress of your project at least once every year and at the conclusion of the project. Failure to report as required will result in suspension of your approval to proceed with the project.

DUHREC may need to audit this project as part of the requirements for monitoring set out in the National Statement on Ethical Conduct in Human Research (2007).

Human Research Ethics Unit
research-ethics@deakin.edu.au
Telephone: 03 9251 7123
DEAKIN UNIVERSITY
PLAIN LANGUAGE STATEMENT AND CONSENT FORM

TO: Participants

Plain Language Statement

Date: 02/11/2011

Full Project Title: Psychosocial factors of non-suicidal self-injury: Attachment, emotion regulation, alexithymia, and environmental stress

Component: Online Questionnaire

Principal Researcher: Dr Helen Mildred

Student Researcher: Manon E Burgat

This Plain Language Statement is 3 pages long. Please make sure you have all the pages.

1. Your Consent

You are invited to take part in this research project. We are seeking people aged 18 years and over, who are able to answer questions in English using a computer.

This Plain Language Statement contains detailed information about the research project. Its purpose is to explain to you as openly and clearly as possible all the procedures involved in this project so that you can make a fully informed decision whether you are going to participate.

Please read this Plain Language Statement carefully. Feel free to ask questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this.

Once you understand what the project is about and if you agree to take part in it, you will be asked to agree to participate. By agreeing to participate, you indicate that you understand the information and that you give your consent to participate in the research project.

You will be able to print a copy of the Plain Language Statement to keep as a record.

2. Purpose and Background

The purpose of this project is to examine how particular psychological and interpersonal factors may be linked to the presence or absence of behaviour where a person hurts themselves on purpose without meaning to end their life. Previous research has shown that some people may be more inclined to hurt themselves on purpose than others. The aim of this research is to explore the way in which attachment relationships with specific individuals, the ability to identify, verbalise and regulate emotions, and environmental pressures may impact upon self-inflicted injuries. It is hoped that the information gathered will lead to a greater understanding of these behaviours and may be used to help people to cope in less harmful ways.
The results of this research will be used to help Manon Burgat obtain a Doctorate of Psychology (Clinical) degree.

3. Funding
This research is totally funded by Deakin University, School of Psychology within the Faculty of Health.

4. Procedures
Participation in this project will involve:

- Completing a questionnaire that may be accessed via the Internet, in your own time and on your own computer. Questions will be asked about your relationships with each of your parents or parental figures, your romantic partner (if applicable), and your best friend (i.e. rating how strongly you agree or disagree with statements such as “It helps to turn to this person in times of need.”). There will also be questions about your experiences identifying and labelling your emotions (i.e. rating how strongly you agree or disagree with statements such as, “I am often confused about what emotion I am feeling”), as well as questions regarding how you manage these emotions (i.e. rating how strongly you agree or disagree with statements such as, “When I’m upset I have difficulty focusing on other things.”). If you have ever hurt yourself on purpose without meaning to end your life, there are questions about what sorts of behaviours you may have engaged in in the past, and there is a question about what sorts of events tend to precede these behaviours. You are not required to complete this part of the survey if you think that you will find it distressing, nor should you proceed in the survey if you find any question uncomfortable.

- The questionnaire is estimated to take about an hour of your time to complete.

5. Possible Benefits
Possible benefits may include learning about your relationship styles, and your ability to identify and manage your emotions; although we cannot guarantee or promise that you will receive any benefits from participating in this project. Possible benefits for the field of psychology include learning more about non-suicidal self-injury, and understanding how relationships with certain individuals and the ability to regulate emotions may contribute to an individual’s tendency to hurt him/her self on purpose. With this greater understanding, it is hoped that the information gathered in this project may be used to help people to cope using less harmful behaviours.

6. Possible Risks
We do not think that you should experience any significant inconvenience while completing this questionnaire. It is not expected that this study will be stressful or demanding, but if any research question causes you any discomfort, please feel free to withdraw from the study. There may be additional unforeseen or unknown risks. If you become upset or experience any distress, please speak with someone you trust, contact your health professional, or call Lifeline on 13 11 14 to talk things through. Lifeline is available 24 hours a day, 7 days a week in Australia. If you are not from Australia, please contact your local health service or a 24-hour support phone line. Such phone numbers are often listed in the front of phone books. Alternatively, you may access these self-help websites http://www.dailystrength.org/c/Self-Injury/support-group or http://www.sisupport.org/

7. Privacy, Confidentiality and Disclosure of Information
The questionnaire is anonymous. Any information obtained in connection with this project and that can identify you will remain confidential.
If you agree to participate, we plan to use the results in a research thesis and a research publication. In any publication, information will be reported as group data and individual results will not be used. This means that you will not be personally identifiable in any published results of this research project.

The information obtained by completing this questionnaire will be stored as per Deakin University’s research regulations. This includes storage of the information at Deakin University for a minimum of six years from the date that the research report is completed, after which the files will be permanently destroyed. All files will be kept on the Deakin University server behind a firewall, and will be password protected. The only people who will be able to access the file will be the researchers involved in the project.

8. Results of Project

If you are interested in having the results of this research sent to you, you will be asked to provide a contact address for this purpose and we will not contact you under any other circumstance. Only group results will be available, it will not be possible to provide individual results, as the information collected will be anonymous. There may be a long delay between completing the questionnaire and the availability of the results, as this research project will not be completed until December 2013.

9. Participation is Voluntary

Participation in any research project is voluntary. If you do not wish to take part you are not obliged to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage until the questionnaire is submitted to the Deakin University server. Once you have submitted the questionnaire, it will not be possible to withdraw from the project as no personal identifying information is being collected and the researchers will not be able to locate your individual questionnaire. The exception to this will be if you provide contact details (to obtain the results of the study). In this case if you wish to withdraw, you can e-mail the research supervisor and your answers will be permanently destroyed.

Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your relationship with Deakin University or any other organisation to the best of our knowledge.

Before you make your decision, you can email the research team with any questions you have about the research project. You can ask for any information you want. There may be a small delay in response to questions, but you will receive an answer as soon as possible. Agree to participate only after you have had a chance to ask your questions and have received satisfactory answers.

10. Ethical Guidelines

This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

The ethical aspects of this research project have been approved by the Human Research Ethics Committee of Deakin University.

11. Complaints

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about your rights as a research participant, then you may contact:

The Manager, Research Integrity, Deakin University, 221 Burwood Highway, Burwood
12. Further Information, Queries or Any Problems

If you require further information, wish to withdraw your participation or if you have any problems concerning this project, you can contact the principal researcher Dr Helen Mildred by email on helen.mildred@deakin.edu.au or by telephone on (03) 9251 7371 (International Ph: +613 9251 7371).

The researchers responsible for this project are:

Dr Helen Mildred and Manon Burgat

School of Psychology, Faculty of Health
Deakin University
221 Burwood Highway
Burwood, Vic, 3125
Appendix C: Study 2 Plain Language Statement and Consent Form

DEAKIN UNIVERSITY
PLAIN LANGUAGE STATEMENT AND CONSENT FORM

TO: Participants

Plain Language Statement

Date: 02/11/2011

Full Project Title: Psychosocial factors of non-suicidal self-injury: Attachment, emotion regulation, alexithymia, and environmental stress

Component: Diary Study

Principal Researcher: Dr Helen Mildred

Student Researcher: Manon E Burgat

This Plain Language Statement is 6 pages in length. Please make sure you have read and understood all of the pages.

13. Your Consent

You are invited to take part in this research project. We are seeking people aged 18 years and over, who have an internet-based mobile phone that can receive text messages and access webpages, and are able to answer both closed and open-ended questions in English.

This Plain Language Statement contains detailed information about the research project. Its purpose is to explain to you as openly and clearly as possible all the procedures involved in this project so that you can make a fully informed decision whether you are going to participate.

Please read this Plain Language Statement carefully. Feel free to ask questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this.

Once you understand what the project is about and if you agree to take part in it, you will be asked to agree to participate. By agreeing to participate, you indicate that you understand the information and that you give your consent to participate in the research project. In order to obtain consent, you will be asked to sign a form at the end of this Plain Language Statement.

You will be able to keep a copy of the Plain Language Statement as a record.

14. Purpose and Background

The purpose of this project is to examine how particular psychological and interpersonal factors may be linked to the presence or absence of behaviour where people hurt themselves on purpose and without meaning to end their lives. Previous research has shown that some people may be more inclined to hurt themselves on purpose than others. The aim of this research is to explore the way in which the ability to identify, label and regulate emotions, and environmental pressures may impact upon self-inflicted injuries. It is hoped that the
information gathered will lead to a greater understanding of these behaviours and may be used to help people to cope in less harmful ways.

The results of this research will be used to help Manon Burgat obtain a Doctorate of Psychology (Clinical) degree.

15. Funding

This research is totally funded by Deakin University, School of Psychology within the Faculty of Health.

16. Procedures

Participation in this project will involve:

- Initially, participation in this project will require meeting with the student researcher to obtain the materials required for participating in the project (i.e. the diary booklet to fill out), and to complete a consent form and a paper-and-pencil questionnaire. This meeting will take place at Deakin University’s Burwood campus.

- The questionnaire is estimated to take approximately 30 minutes to an hour of your time. Questions will be asked about your relationships with each of your parents or parental figures, your romantic partner (if applicable), and your best friend (i.e. rating how strongly you agree or disagree with statements such as “It helps to turn to this person in times of need.”). There will also be questions about your experiences identifying and labelling your emotions (i.e. rating how strongly you agree or disagree with statements such as, “I am often confused about what emotion I am feeling”), as well as questions regarding how you manage these emotions (i.e. rating how strongly you agree or disagree with statements such as, “When I’m upset I have difficulty focusing on other things.”). If you have ever hurt yourself on purpose without meaning to end your life, there are questions about what sorts of behaviours you may have engaged in in the past, and there is a question about what sorts of events tend to precede these behaviours. You are not required to complete this part of the survey if you find it distressing to do so, nor should you proceed in the survey if you find any question uncomfortable.

- Following this initial meeting, participation in the project will require that you complete a diary for a 2-week time period. Using a webpage accessible using your mobile phone, this will involve completing questions relating to where you are, what you are doing, who you are with, how you are feeling, and the events that have led you to feel this way. You will be prompted to complete the diary each time, randomly, by a text message to your mobile phone five times a day between the hours of 8am and 10pm.

- At the completion of the two-week time period, you will receive a text message linking you to a second webpage that will enable you to complete a questionnaire asking you about whether you thought about engaging in, or actually engaged in, self-harm without the intent to die. If you find this part of the study distressing, you should not complete it.

- Finally, once the diary and final questionnaire has been completed, you will be asked to complete the same questionnaire you completed at the initial interview with the student researcher. This questionnaire will be accessible via the internet.

17. Possible Benefits

Possible benefits may include learning about your ability to identify and manage your emotions; although we cannot guarantee or promise that you will receive any benefits from
participating in this project. Possible benefits for the field of psychology include learning more about non-suicidal self-injury, and understanding how the ability to regulate emotions may contribute to an individual’s tendency to hurt him/her self on purpose. With this greater understanding, it is hoped that the information gathered in this project may be used to help people to cope using less harmful behaviours.

18. Possible Risks
It is recognised that participation in this project may come with a degree of inconvenience to you, however it is not anticipated that you should experience distress as a result. If, however, any research question causes you any discomfort, please feel free to withdraw from the study at any time. There may be additional unforeseen or unknown risks. Please note that although your diary entries will be automatically submitted online at the completion of each time point through a highly secure website, this website will remain unattended and data from it will not be viewed until the study has been completed. If you become upset or experience any distress at any stage during the study, please speak with someone you trust, contact your health professional, contact Deakin Counselling Service (ph: 03 9244 6965), or call Lifeline on 13 11 14 to talk things through. Lifeline is available 24 hours a day, 7 days a week in Australia.

19. Privacy, Confidentiality and Disclosure of Information
Although your contact details will be obtained for the purposes of text messaging a prompt to your mobile phone, so that you may be entered into the raffle to win a JB HiFi voucher (should you choose to be), and to allow you to withdraw from the study at any stage or obtain a copy of the final results, information obtained in connection with this project that can identify you will remain confidential. The survey and diary you complete will have a number code so that they can be matched at the conclusion of the two-week period, however your name will not be placed anywhere on the diary. Information regarding contact details and code numbers will be kept in a locked filing cabinet, separate to the diary material submitted online, so as to maintain confidentiality. Only the student researcher will have access to your contact details, except in circumstances of significant risk where the principle supervisor need to be involved.

Please also be assured that the website with which you will submit your diary entries is highly secure, and that your entries will not be viewed by the student researcher until the conclusion of the two-week study time period.

If you agree to participate, we plan to use the results in a research thesis and a research publication. In any publication, information will be reported as group data and individual results will not be used. This means that you will not be personally identifiable in any published results of this research project.

The information obtained by completing this questionnaire will be stored as per Deakin University’s research regulations. This includes storage of the information at Deakin University for a minimum of six years from the date that the research report is completed, after which the files will be permanently destroyed. All files will be kept on Deakin University premises, in a locked filing cabinet in a locked office. The only people who will be able to access the file will be the researchers involved in the project.

20. Results of Project
If you are interested in having the results of this research sent to you, you will be asked to provide a contact address for this purpose and we will not contact you under any other circumstance. Only group results will be available, it will not be possible to provide individual results, as the information collected will be anonymous. There may be a long delay between completing the questionnaire and the availability of the results, as this research project will not be completed until December 2013.
21. Participation is Voluntary

Participation in any research project is voluntary. **If you do not wish to take part you are not obliged to.** If you decide to take part and later change your mind, **you are free to withdraw from the project at any stage** up until the completion of the project. In this case whereby you wish to withdraw, you should complete the ‘Revocation of Consent’ form located at the conclusion if this Plain Language Statement, and mail or email it to the provided address. If you do wish to withdraw at any time your diary entries and answers to questionnaires will not be used in the final results. If requested, your data may be permanently destroyed at the time of withdrawal from the study.

Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your relationship with Deakin University or any other organisation to the best of our knowledge.

Before you make your decision, you can email the research team with any questions you have about the research project. You can ask for any information you want. There may be a small delay in response to questions, but you will receive an answer as soon as possible. Agree to participate only after you have had a chance to ask your questions and have received satisfactory answers.

22. Ethical Guidelines

This project will be carried out according to the *National Statement on Ethical Conduct in Human Research* (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

The ethical aspects of this research project have been approved by the Human Research Ethics Committee of Deakin University.

23. Complaints

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about your rights as a research participant, then you may contact:

The Manager, Research Integrity, Deakin University, 221 Burwood Highway, Burwood Victoria 3125, Telephone: 9251 7129, Facsimile: 9244 6581; research-ethics@deakin.edu.au

Please quote project number [2011-243].

24. Further Information, Queries or Any Problems

If you require further information, wish to withdraw your participation or if you have any problems concerning this project, you can contact the principal researcher Dr Helen Mildred by email on helen.mildred@deakin.edu.au or by telephone on (03) 9251 7371 (International Ph: +613 9251 7371).

The researchers responsible for this project are:

Dr Helen Mildred and Manon Burgat

School of Psychology, Faculty of Health
Deakin University
221 Burwood Highway
Burwood, Vic, 3125
Consent Form

Date: 02/11/2011

Full Project Title: Psychosocial factors of non-suicidal self-injury: Attachment, emotion regulation, alexithymia, and environmental stress

I have read and I understand the attached Plain Language Statement.

I freely agree to participate in this project according to the conditions in the Plain Language Statement.

I have been given a copy of the Plain Language Statement and Consent Form to keep.

The researcher has agreed not to reveal my identity and personal details, including where information about this project is published, or presented in any public form.

Participant's Name (printed) .................................................................

Signature ................................................................. Date ..................

Please indicate your interest in going into the draw for a JB HiFi voucher valued at $100 by ticking one of the following boxes:

☐ Yes, I would like to be placed in the draw.

☐ No, I do not want to be placed in the draw.
To: Diary Study Participants

Revocation of Consent Form

(To be used for participants who wish to withdraw from the project)

Date: 02/11/2011

Full Project Title: Psychosocial factors of non-suicidal self-injury: Attachment, emotion regulation, alexithymia, and environmental stress

I hereby wish to WITHDRAW my consent to participate in the above research project and understand that such withdrawal WILL NOT jeopardise my relationship with Deakin University.

Participant’s Name (printed) ........................................................................................................

Signature ............................................................................................................................ Date

...........................................................................

Please mail or scan and email this form to:

Manon Burgat
School of Psychology
Faculty of Health
Deakin University
221 Burwood Highway
Burwood, VIC 3125

mebur@deakin.edu.au