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UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL AND HUMAN SCIENCES

School of Psychology

**GENDER DIFFERENCES AND
DELIBERATE SELF-INJURY**

by

Chloe de Haast

Thesis for the degree of Doctorate in Clinical Psychology

May 2014

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

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Chloe de Haast

Self-injurious behaviours are associated with long-term negative consequences for social, emotional and physical wellbeing. As such, and in order to inform the development of both treatment plans and preventive approaches, it is necessary to develop a comprehensive understanding of the aetiological factors associated with self-injury. In the first instance, literature assessing the prevalence of self-injury in adolescents was systematically assessed in order to determine the presence of gender differences. This was in response to a lack of clarity within the self-injury field as to whether there are gender differences in the prevalence of self-injurious behaviours. Thirty seven studies were included in the final review and were grouped according to the exclusion of suicidal intent and the assessment method of self-injury. Common methodological limitations across all studies are discussed, including the variation in definition and assessment of self-injury. Results suggested that female adolescents were significantly more likely to report engaging in self-injurious behaviour than males. However, it is unclear whether this finding reflects a gender bias in how self-injury is assessed, or whether there is a true difference in self-injury rates. Gender differences were also reported in both the method and function of self-injury. Recommendations are offered with respect to future research and regarding 'gold standard' methods of assessment.

In an empirical study, we aimed to improve our understanding of the risk factors and potential functions of self-injurious females and, specifically, whether these differed by gender. Based on previous literature it was hypothesised that an insecure attachment style, either anxious or avoidant, may result in deficits in effective emotion regulation skills. As such, these individuals may become reliant on maladaptive strategies such as self-injury. Three hundred and seventy adults completed measure of attachment style, emotion dysregulation, alexithymia and self-injury. Results suggested a lifetime prevalence of 50.8%, which was notably higher than previous research findings. Furthermore, and contrary to previous research, there were no significant gender differences in prevalence. With respect to the proposed model of mediation, in females there was clear evidence to suggest that emotion dysregulation mediates the

relationship between attachment insecurity and self-injurious behaviour. This has important implications for the development of effective preventative and treatment approaches for self-injury in females. In contrast, no such relationship was demonstrated in males. This suggests the need for future research efforts directed at understanding the origins and function of self-injury in males.

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DECLARATION OF AUTHORSHIP

I, Chloe de Haast

declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

Gender Differences and Deliberate Self-Injury

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
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7. [Delete as appropriate] None of this work has been published before submission [or] Parts of this work have been published as: [please list references below]:

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Date:.....

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Chapter 1: Literature Review

A Systematic Review of Gender Differences in the Prevalence of Self-Injurious Behaviours

1.1 Introduction

Self-injurious behaviours are associated with a number of long-term negative consequences and, as a result, they are receiving increasing attention from researchers and clinicians around the world. Of primary concern, there is a consensus that self-injury is a robust predictor of suicidal thoughts and behaviours; individuals with histories of self-injury are at greater risk of suicide attempts and this relationship holds true regardless of the method of self-injury assessment. (Hamza, Stewart & Willoughby, 2012). Although self-injury often serves to alleviate negative affect (Klonsky, 2007); additional negative consequences can be found at an emotional, social and physical level (Wilkinson & Goodyer, 2011). Following deliberate self-injury, individuals can be left with complex feelings of guilt and shame (Briere & Gil, 1998) and this may serve to increase their negative emotional arousal in the long term (Gratz, 2003). Furthermore, self-injurious behaviour can arouse negative reactions in others; Gratz (2003) highlights how this may have the potential to disrupt interpersonal relationships, contributing further to social isolation. Finally, the negative physical consequences from self-injury can include infection and scarring (Wilkinson & Goodyer, 2011).

1.1.1 Issues of Definition in Self-Injurious Behaviour

The term self-injurious behaviour includes a wide spectrum of behaviours. Crucially, caution needs to be taken when making generalised statements about those who engage in self-injury as there is considerable heterogeneity within the group (Skegg, 2005). Theorists have proposed the existence of a continuum of self-injury; low-lethality actions without suicidal intent at one end and completed suicide at the most extreme end. However, despite numerous attempts, no single system of classification for self-injurious behaviour has yet to been widely accepted, and there is ongoing variability in the terms and definitions employed within the literature (Andover, 2012). To illustrate the challenges of synthesising such a literature, terms in historical and current use to describe non-fatal self-inflicted harm include: attempted suicide; deliberate self-harm; parasuicide; self-injury; self-mutilation, and non-suicidal self-injury.

At the present time, the two terms in most common use are deliberate self-harm (DSH) and non-suicidal self-injury (NSSI); although even these definitions differ dependent on the

country of usage. In Europe and Australia, DSH refers to a deliberate act of self-injury with a non-fatal outcome, with and without suicidal intent (Madge et al., 2008). As a result, this definition includes behaviours which researchers argue are higher in lethality and suicidal intent; for example jumping from a height and self-poisoning. In contrast, the same term when employed by researchers in Canada and the United States often refers to the deliberate destruction of body tissue without conscious suicidal intent and usually excludes self-poisoning and methods of high lethality (Gratz, 2002). For the purposes of this review, DSH is referred to as per Madge et al.'s (2008) definition of any act of self-injury, regardless of suicidal intent.

Non-suicidal self-injury is defined as the deliberate, self-inflicted destruction of body tissue without suicidal intent and for purposes not socially sanctioned (Nock, 2010). Typical behaviours associated with NSSI include cutting, burning, hitting, severe skin scratching and interfering with wound healing (Favazza & Conterio, 1989). Jacobson and Gould (2007) have criticised research studies which fail to separate NSSI and behaviours with suicidal intent, such as those measuring deliberate self-harm. Muehlenkamp (2005) argues that such behaviours differ with respect to intent, lethality, and chronicity and, as a result, studies which fail to differentiate between them have confounded NSSI with suicidal attempts (Hamza, Stewart & Willoughby, 2012). In response to this and additional arguments, NSSI has recently been accepted into the DSM-V (APA, 2013) under a category of disorders needing future research. The necessary criteria include engagement in intentional self-inflicted damage over 5 or more days, within the last year and in the absence of suicidal intent. Arguably, including NSSI as a clinical disorder in the DSM improves communication between researchers in a field characterised by a lack of definitional clarity and increases the status of NSSI as a research topic in its own right (Muehlenkamp, 2005; Wilkinson & Goodyer, 2011). However, De Leo (2011) expresses concerns as to whether we have sufficient knowledge about self-injury to confidentially position it within a classification system, particularly given the heterogeneity of persons engaging in said behaviours.

Deliberate self-harm and NSSI are distinguished on the basis of the importance of suicidal intent. Consequently, in order to determine whether an individual meets the criterion for NSSI, there is an assumption that suicidal intent is a dichotomic (yes/no) variable. However, De Leo (2011) highlights how suicide intention is a multidimensional variable and individuals often feel ambiguous about the lethality of their actions. Furthermore, understandings of the definition of suicidal intent may differ between patients, clinicians and researchers (Hawton, Saunders & O'Connor, 2012). This is arguably reflected in the counterintuitive findings of recent research into self-injury and suicidal intent. Due to the exclusion of self-poisoning from NSSI, there is an associated assumption that such 'high-lethality' behaviour should occur in the presence of

suicidal intent. By extension of the same logic, 'low-lethality' behaviours commonly associated with NSSI, such as cutting or scratching, should occur in the absence of suicidal intent.

However, studies suggest that the majority of people interviewed following an overdose or near-fatal self-harm neither wanted nor expected to die (Douglas et al., 2004; Morgan, Burns-Cox, Pocock & Pottle, 1975). Furthermore, when Rodham, Hawton and Evans (2004) questioned adolescents about their motives to self-cut; 40.2% selected the reason 'wanted to die' from a presented list. Similarly, Martin, Swannell, Hazell, Harrison and Taylor (2010) found that 50% of respondents in a population based study of self-injury reported they wanted to die. Of significance, in the long term results of the Multi-centre Study of Self-Harmers in the UK, it was found that self-cutters were at higher risk of completed suicide than those overdosing with medication (Hawton, 2011; as cited in De Leo, 2011). These findings suggest that we cannot simply correlate lethality of method with suicidal intent and therefore it is important to question the validity of excluding behaviours from NSSI on the basis of presumed high lethality. Furthermore, such concerns are compounded by the number of studies of NSSI that fail to question participants about suicidal intent and presume that engagement in a 'low-lethality' behaviour assumes an absence of suicidal intent. As an alternative, it may be of more value to classify behaviours with respect to method of self-injury.

In summary, the concept of self-injury represents a wide spectrum where behaviours differ with respect to a number of variables including intent, method of injury and lethality. DSH and NSSI are the terms most commonly employed by researchers to categorise such behaviours. However, it is unclear whether suicidal intent is a valid method of distinction, particularly given concerns around dichotomous measurement, interpretation and presumed absence of intent. Given the preceding discussion, it is perhaps more understandable why clinicians and researchers have yet to agree upon a single term and definition for self-injurious behaviour. Unfortunately, this lack of consensus has resulted in disparate assessment methodologies throughout the literature precluding accurate comparisons across studies (Meuhelenkamp, Claes, Havertape & Plener, 2012). Furthermore, Evans, Hawton, Rodham and Deeks (2005) highlight how researchers should be mindful as to whether their methods of measuring self-injury will actually assess the phenomena they are interested in. For example, studies of NSSI where participants are not questioned regarding their suicidal intentions. Having an agreed definition and assessment method for self-injurious behaviours would improve comparison across studies being conducted on prevalence, demographic features, risk factors and psychosocial correlates. However, as noted by De Leo (2011), a shared definition must grow out of sufficient scientific understanding of the phenomenon at an international level of discussion.

Establishing an accurate prevalence rate for self-injurious behaviour is understandingly hampered by the aforementioned issues, particularly when attempting to synthesise cross-nation findings. In a valiant attempt to establish a global perspective on the prevalence of self-injurious behaviour in adolescents, Muehlenkamp, Claes, Havertape and Plener (2012) systematically reviewed the literature between 2005 and 2011. Fifty-two studies met the inclusion criteria and were divided into NSSI and DSH, although it is unclear on what basis. There were no statistically significant differences between the average rates for NSSI and DSH suggesting the studies are likely to be measuring similar phenomena. Arguably, this finding could be taken to suggest it is of limited value to differentiate self-injury on the basis of suicidal intent. However, Muehlenkamp et al. (2012) goes on to highlight the importance of continuing to differentiate self-injury with and without suicidal intent due to essential qualitative and phenomenological differences (Muehlenkamp & Kerr, 2010). In other noteworthy findings, the type of assessment tool utilised appeared to impact the prevalence rates across both NSSI and DSH; studies utilizing single item assessments found an average prevalence rate significantly lower than those using behavioural checklist surveys. This suggests the existence of an assessment bias and highlights the importance of establishing an international best-practice assessment process to ensure validity. Finally, although there was considerable variability across samples, a mean lifetime prevalence of 18% (SD = 7.3) was observed for NSSI behaviour and 16.1% (SD = 11.6) for DSH in an adolescent population. These findings suggest that a significant percentage of adolescents are likely to engage in self-injury during their lifetime. This fact, combined with evidence indicating that onset of self-injury generally occurs during adolescence (Klonsky & Muehlenkamp, 2007), suggests that the most appropriate focus of this current review will be young people aged 11 to 18 years.

1.1.2 Gender Differences and Self-Injurious Behaviour

Given that such a significant proportion of adolescents are at risk for self-injury, it is crucial that the field is able to identify the sub-group of this population most likely to engage in self-injurious behaviours. One demographic characteristic which has caused considerable debate in the literature is the risk associated with gender. The prevailing belief seems to be that females self-injure more than males (Skegg, 2005; Klonsky & Muehlenkamp, 2007). This is reflected in the fact that, prior to the 2000s, the majority of studies examining self-injurious behaviours focused on females (Favazza & Conterio, 1989; Herpertz, 1995). However, recent studies have suggested that self-injury may be equally as common in men (Andover, Primack, Gibb & Pepper, 2007; Muehlenkamp & Gutierrez, 2004). Evans et al. (2005) synthesised the results of 6 studies which examined gender differences in deliberate self-injury in adolescents, they found the prevalence over a 6 month time-frame was 1.5 times higher for females, although

no significant differences were found over the lifetime prevalence. Similarly, Fliege, Lee, Grimm and Klapp (2009) systematically reviewed psychosocial correlates of self-injury in the absence of conscious suicidal intent. They found that six studies on adolescents found a higher prevalence in females and one study found no such difference. Finally, in a review focusing specifically on NSSI, Jacobson and Gould (2007) commented on how the data were inconclusive as to whether NSSI was more common among females than males. When questioning whether self-injury is more prevalent among women than men, it is also crucial to call into question potential biases in the population and measurement of self-injury. For example, much of the research demonstrating a link between women and self-injury has been conducted in populations where women may be over-represented. Furthermore, there may also be gender differences in the willingness to report self-harm, particularly as self-injury is often constructed in the media as a prototypically feminine behaviour (Jarvi, Jackson, Svenson & Crawford, 2013). In summary, it appears there is tentative evidence that self-injury is more prevalent in females, although a more robust review of the literature is needed before stronger conclusions can be made.

Aside from establishing whether there are gender differences in the prevalence of self-injurious behaviour, understanding differences in the basic parameters of self-injury; for example method of self-injury, frequency and function, is crucial in tailoring assessment and treatment interventions. To the best of our knowledge, two studies have systematically investigated gender differences in NSSI among an undergraduate population. Andover et al. (2010) found that men and women did not differ with respect to prevalence or frequency of NSSI and described similar experiences of pain during NSSI and control over the behaviour. However, men reported a significantly older age of onset; 13.83 versus 11.57 years, and women greater degrees of medical injury. Furthermore, men and women reported differences in NSSI method with men significantly more likely to report burning behaviours and women cutting behaviours. The findings of Whitlock et al. (2011) replicated the findings with regards to NSSI method; females were more likely to endorse cutting and males punching objects. However, they found a significant difference with regard to prevalence with females 1.8 times more likely than males to report NSSI, although there were no significant differences within the past 12 months.

In relation to an adolescent population, Lundh, Karim and Quilisch (2007) studied self-injurious behaviour in 15-year-old Swedish adolescents and found that girls were more likely to report self-harm by cutting, although there was no overall difference in DSH rate. It could therefore be argued that the findings of differences in gender prevalence may be related to the type of self-injury method employed (Klonsky & Meuhelenkamp, 2007; Andover et al. 2010). Establishing whether gender differences exist in the method of self-injury may have important

implications for assessment and in establishing any differences in function. Evidence suggests that the most frequently endorsed motivation for self-injury is for the purpose of affect regulation (Klonsky, 2007), and this is true for both genders (Laye-Gindhu & Schonert-Reichl, 2005). However, studies have also reported gender differences in the motivations for and functions of self-injurious behaviour. For example, Laye-Gindhu and Schonert-Reichl (2005) found that boys endorsed arguably more ‘superficial’ reasons; for example: boredom, means of joining a group, ‘I thought it would be fun’ and avoiding having to do something. In contrast, girls were more likely to report increased distress; ‘I felt very unhappy or depressed’ and a need to hurt themselves. Evidence also suggests that females are more likely to self-injure in private, whereas boys also did so with peers (Laye-Gindhu & Schonert-Reichl, 2005; Whitlock et al. 2011). In summary, these results suggest clear differences in the basic parameters and motivations for self-injurious behaviour by gender. However, to determine accurately the characteristics of self-injury by gender, it is necessary to systematically quantify the research findings of all available studies.

1.2 Aim of the Review

There are a number of excellent reviews on self-injurious behaviour, all of which comment on the presence or absence of gender differences in the prevalence of self-injury (Skegg, 2005; Klonsky & Muehlenkamp, 2007; Jacobson & Gould, 2007; Hawton et al. 2012). However, their conclusions are limited by the non-systematic methodologies utilised. Through a systematic review of the literature, this review aims to provide a comprehensive synthesis of all the available research on the question of interest using a transparent and replicable method. Consequently, in an effort to address the inconclusive findings of the literature and to draw robust conclusions of relevance to clinical practice, the primary question of interest in this study is: *are there gender differences in the prevalence of self-injurious behaviours?* By including studies with a variety of terminologies and methodologies, this study hopes to synthesise findings across different countries and cultures in order to achieve a global perspective. Furthermore, only studies utilising a population based sample will be reviewed as they arguably provide the most accurate information on self-injurious behaviour (Evans et al. 2005). A secondary aim of the study is to extract findings that may contribute to our understanding of gender differences in the frequency, method, and function of self-injurious behaviour. Given the lack of empirical evidence in this area, such information may provide useful recommendations for clinicians and a guide for future research enquiry.

1.3 Methodology

With regards to the reporting of the search strategy, the Meta-Analysis Of Observational Studies in Epidemiology (MOOSE) Group (Stroup et al., 2000) checklist was adhered to so far as possible in order to ensure the method is transparent and replicable.

1.3.1 Search Strategy

In order to identify studies relevant to our research question, the databases of PsychINFO, Medline and EMBASE were searched using the following terms: self destructive behaviour OR self injurious behaviour OR self mutilation OR self inflicted wounds OR self harm OR automutilation combined with prevalence OR rates and adolescen*. A combination of subject headings and free text searches was employed and the search was restricted to peer-reviewed, empirical articles published between January 1st, 2008 and the 1st of December, 2013. In order to ensure a comprehensive review of the literature and to identify studies that may not have been included in our initial database search, two additional search strategies were employed. Firstly, the references lists of included studies were examined to identify study titles that may meet inclusion criteria. Secondly, all relevant studies from a systematic review on prevalence of NSSI and DSH in an adolescent sample (Muehlenkamp et al. 2012) were retrieved. Once duplicates had been identified and removed using EndNote X7.0.2, the initial search retrieved 336 references. All of these abstracts were then reviewed by the review author (CdH), a doctoral student who was previously unfamiliar with the literature, and sifted according to the inclusion criteria.

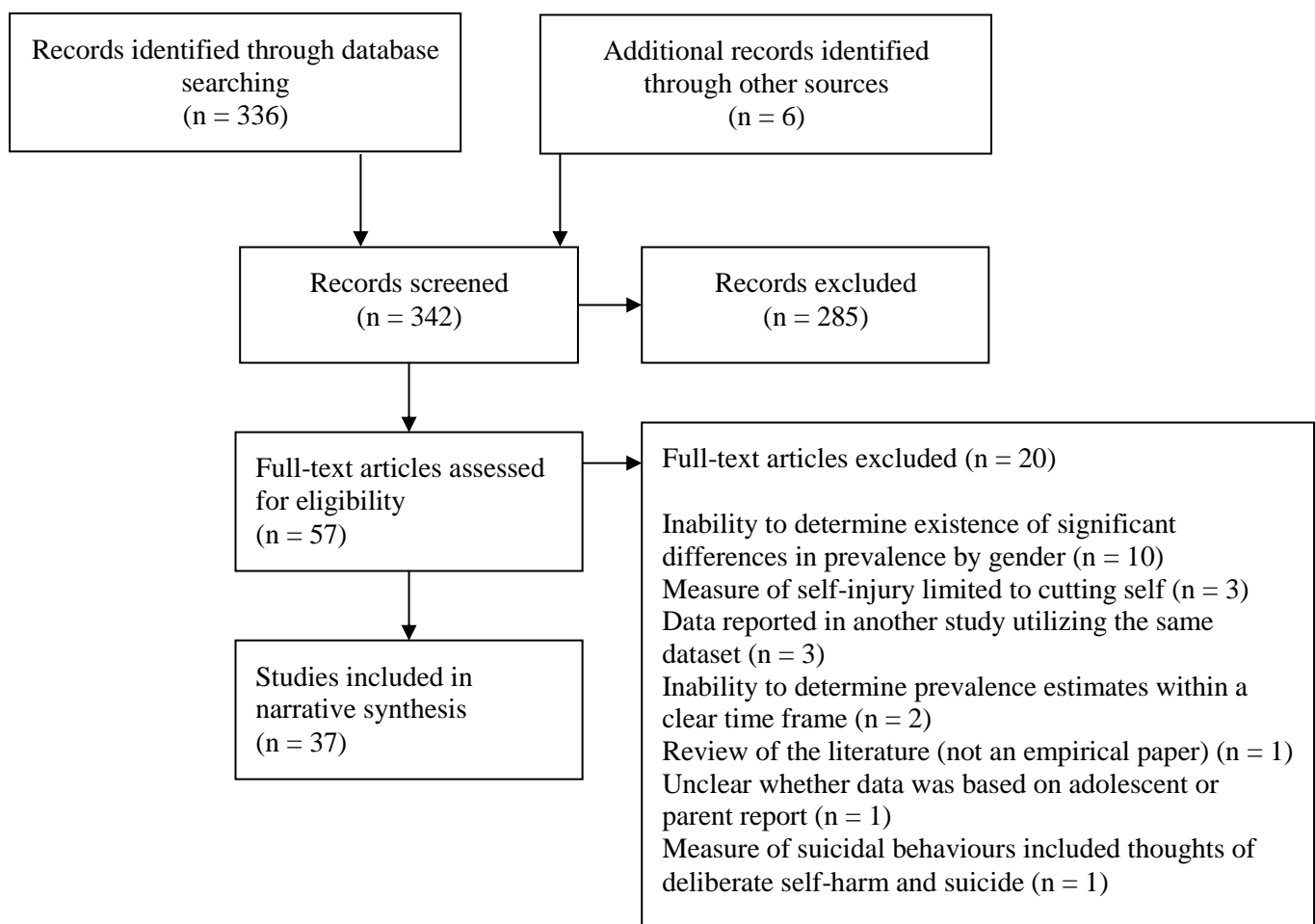
1.3.2 Inclusion and Exclusion Criteria

Studies were included in the review if they met the following criteria: written in English, the study sample was based in a community or school setting and reported empirical data collected from adolescents (age range between 11-18 years or study mean within this range). Furthermore, there was a clearly defined definition of self-injury, the method of self-injury assessment was identifiable and based on adolescent self-report, and the study specified the time frame of their assessment. Finally, significant or non-significant differences between the genders in the prevalence of self-injury had to be presented or possible to calculate.

Studies were excluded if the population had learning disabilities or pervasive developmental disorders, if the sample included fewer than 100 participants and studies that reported prevalence within clinical (inpatient/outpatients/emergency room) settings. Fifty-one papers met the inclusion criteria at abstract and full-text copies were retrieved. These were

reviewed by the review author (CdH) and 20 were excluded for the following reasons: not an empirical paper (n = 1), unclear whether the prevalence figures were based on adolescent or parent report (n = 1), method of self-injury assessment included thoughts of deliberate self-harm and suicide (n = 1), data had been reported in another study utilizing the same dataset (n = 2), no clearly specified time frame of prevalence estimates (n = 2), measure of self-injury limited to cutting self (n = 3) and the inability to determine existence of significant differences in prevalence by gender (n = 10). Thirty-seven studies were included in the final review and the flow chart of the study selection process can be seen in figure 1.

Figure 1
Flow Diagram of Search Process



1.3.3 Data Collection and Grouping of Studies

Data were extracted from the included studies using a data collection tool independently by the review author (CdH). Data extracted included: characteristics of the study sample (including country, age-range, source and break-down by gender), measures of self-injurious behaviour, prevalence figures by gender and outcome of statistical analysis, results of

frequency, method of injury and function when presented separately by gender and related discussion points.

Aggregating studies that comment on gender differences in the prevalence of self-injury is a difficult task because studies rely on different definitions, assessment tools and means of presenting the data. On the basis of the empirical literature, specifically studies which comment on the challenges of defining self-injury, and close examination of the varying assessment tools, studies were grouped according to the exclusion of suicidal intent and the assessment measure of self-injurious behaviour by the review author (CdH). As a result, they can be divided into three groups: one measuring deliberate self-harm and two measuring non-suicidal self-injury. Studies were included within the DSH group when there was no exclusion on the basis of suicidal intent and the interpretation of 'self-harm' was left to the adolescent; example assessment tools included endorsement of statements such as 'I deliberately try to hurt or kill myself'.

The two groups measuring non-suicidal self-injury were divided on the basis of the exclusion of suicidal intent; NSSI – no suicidal intent (NSSI-NSI) group was characterised by studies using a variety of assessment tools, all of which specifically required participants to report behaviours in the absence of suicidal intent. Examples of assessment tools included 'have you ever harmed yourself in a way that was deliberate but not intended as a mean to take your life?' or behaviour checklists where the emphasis was placed on the absence of suicidal intent. The final group; NSSI – behaviour (NSSI-B) was characterised by studies utilizing behavioural checklists representing 'low-lethality' behaviours commonly associated with NSSI e.g. cutting, burning or scratching, but which had failed to direct participants to exclude behaviours in the presence of suicidal intent. It could be argued that the two NSSI groups should be combined, however, given the oft cited importance of separating behaviours on the basis of suicidal intent (e.g. Muehlenkamp et al. 2012) and the finding that 40% of self-cutting in adolescents is associated with 'the intention to die' (Rodham, Hawton & Evans, 2004). It seemed appropriate to separate these groups on the basis of the explicit exclusion of suicidal intent.

1.4 Results

1.4.1 Methodological Considerations

Before commenting on the findings of the identified studies, it seems important to note any common methodological limitations which may impact upon the validity of the study results. For example, the majority of studies utilized a convenience sample restricted to a particular geographical area, such as secondary schools in Glasgow and Stirling. Although the

specifics of the sampling methods were often unclear, in most cases, all the schools within the identified region were invited to participate. As a result, the percentage uptake varied between studies ranging from 10.3% to 100%. This sampling method, although ethically sound, introduces a self-selection bias whereby schools which are struggling with self-injury may be more interested in participating in a study to understand the behaviour. Such a limitation could be addressed by enquiring as to the schools' reasons for participation and non-participation. For example, Borges et al. (2011) reported school headmasters' main reasons for non-participation: scheduling, logistics and coordinating testing, and concluded these were unlikely to bias findings.

Following this invitation process, randomly selected classes were given time during the school day in which to complete the self-report questionnaires. As noted by Yates, Tracy and Luthar (2008), there is evidence to suggest that with most school-based samples, the findings are biased towards health; adolescents who are struggling with self-injury are arguably more likely to be truant from school (Bjarnason & Thorlindsson, 1994), to refuse to participate, or to be enrolled in more specialist, alternative educational settings. As a result, the figures may represent a conservative estimate of self-injurious behaviours. A noteworthy strength of a vast proportion of the included studies is that they recruited over 1,000 participants. Such a large sample is crucial for sufficient power to detect significant differences, particularly when exploring sub-groups within self-injurious behaviour. It is noted later in the review when non-significant findings may be attributed to underpowered calculations.

With regards to study design, the majority of studies relied on a cross-sectional design. The obvious advantages included the potential to compare participants on multiple variables and the ease of data collection. However, such studies are limited in their ability to comment on cause and effect relationships; relevant to exploring how risk factors for self-injurious behaviours may differ by gender. As a result, there are frequent recommendations for future studies to utilize longitudinal designs. A percentage of included studies relied on such a design in order to detect developments or changes in predictor variables; however their conclusions were limited by selective attrition. As per the inclusion criteria, all of the included studies relied on adolescent self-report data with all but one preserving the anonymity of respondents. This consistency is crucial as Evans et al. (2005) found that prevalence figures for suicidal phenomena were higher in studies employing anonymous questionnaires than in interview studies. However, although the anonymity of the self-report may have encouraged more honest answers, other factors may have impacted on the results validity. Firstly, some students may have struggled to comprehend the questions or interpreted them differently. Secondly, the stigma of self-injury may have still resulted in underreporting and finally, the retrospective nature of the data may have resulted in recall bias. It could be suggested retrospective self-report

data should be combined with alternative methods of data collection; for example ecological momentary assessment (Nock, Prinstein & Sterba, 2010).

Aside from the obvious challenge of synthesising findings from studies utilizing different definitions and measures of self-injurious behaviours, there are limitations to the two main assessment tools that should be taken into account. Firstly, studies which depend on single item assessments for self-injury have low discrimination; the validity of this method relies totally on the sensitivity of this single item and there is no additional information on method, severity or intentionality. Furthermore, the interpretation of ‘deliberate self-injury’ is unknown and dependent entirely on the adolescent. However, evidence suggests that adolescents’ perception of self-injury is generally concordant with a consensus definition of self-injury (Stanford & Jones, 2010). A number of studies offered examples of self-injurious behaviours to guide participants; for example ‘by taking an overdose of pills or by cutting yourself’. Researchers need to be conscious of the potential impact of terminology on prevalence rates. It is possible that the inclusion of terms such as ‘or even killed you’ may prime the participants to consider suicidal behaviours in a way that counteracts the retrieval of non-suicidal forms of self-harm (Lundh, Karim & Quilisch, 2007). As recommended by Meuhlenkamp et al. (2012), a gold-standard assessment process may include a single-item assessment which, if endorsed positively, results in an interview process to ensure there is consensus between the researcher and adolescent in their understanding of self-injurious behaviour. The second commonly employed measure are behavioural checklists; respondents are required to endorse whether or not they have engaged in an identified behaviour in addition to related information such as frequency and severity. There are a number of standardised checklists including: modified versions of the Deliberate Self-Harm Inventory (Gratz, 2001); the Functional Assessment of Self-Mutilation (Lloyd, Kelley & Hope, 1997) and the Non-Suicidal Self-Injury Scale (You, Leung, Fu & Lai, 2011). Unfortunately, studies often fail to report the psychometric properties of each checklist and it unclear on what basis various behaviours have been included. To ease cross-study comparison, the self-injury field may benefit from systematically reviewing the robustness of these different methods and selecting one as a gold-standard assessment tool.

Finally, although it is appreciated that the majority of included studies do not have the identification of gender differences as a primary aim, it seems illogical to comment on prevalence differences by percentage and not to conduct a statistical analysis to identify significant differences. Nevertheless, it was possible for the review author (CdH) to conduct a statistical analysis using an interactive calculation tool (Preacher, 2001) when the raw data were available in one study. On a related issue, out of the thirty-eight studies included in this review, only five offered a hypothesis to explain either the presence or absence of gender difference in their research findings. Unfortunately, this significantly limits theory development and provides

minimal grounds for future research questions. The above section on methodological considerations provides an overview of common limitations present in the included studies, where a particular strength or weakness of a study may contribute to the interpretation of findings later in the review, this is mentioned separately.

1.4.2 Features across the Studies

Tables 1, 2 and 3 provide a summary of the extracted data from each study. With regards to the time frame in which self-injury was assessed; across the three groups approximately 50% of the studies measured lifetime prevalence, 35% prevalence over the past year and the remaining 15% focused on six month prevalence. When a study measured a past year and lifetime prevalence, the lifetime prevalence only has been reported. The vast majority of populations were sampled from North America or Europe, however just over 20% represented Asian cultures. As discussed previously, the results will be presented according to the following three groups: Deliberate Self-Harm (DSH), Non-Suicidal Self-Injury – No Suicidal Intent (NSSI-NSI) and Non-Suicidal Self-Injury – Behaviour (NSSI-B).

1.4.3 Deliberate Self-Harm

Table 1
Gender Prevalence of Deliberate Self Harm in Adolescents

Significant Gender Differences							
Study	Country	Sample Size	Age Range M (SD)*	Assessment	Time Frame	Prevalence by Gender	Significant Difference?
Morey et al. (2008)	Ireland	3,830	15-17	Single question Y/N & coding of open response ^a	Lifetime	F = 13.9% M = 4.3%	Risk Ratio = 3.2
Portzy et al. (2008)	Belgium	4,431	15.45 (0.8)	Single question Y/N & coding of open response	Lifetime	F = 14.6% M = 6.3%	Odds Ratio = 2.8
	Netherlands	4,458	15.05 (0.6)			F = 5.6% M = 2.6%	
O'Connor et al. (2009)	Scotland	2,000	15-16	Single question Y/N	Lifetime	F = 5.6% M = 2.6%	Odds Ratio = 3.37
Shin et al. (2009)	Korea	1,857	13.75 (1.0)	Single question Y/N	6 months	F = 10.51% M = 7.85%	X ² = 3.89 P < 0.05
Kvernmo & Rosenvinge (2009)	Norway	447	12-16	Single question Y/N	6 months	F = 16.8% M = 7.2%	X ² = 8.3 P = 0.003
Landstedt & Gadin (2011)	Sweden	1,633	17	Single question Y/N	Lifetime	F = 23.3% M = 10.5%	X ² = 69.47 P < 0.001
Tsai et al (2011)	Taiwan	742	17	Single question Y/N	Lifetime	F = 19.2% M = 8.9%	Odds Ratio = 3.47
Watanabe et al. (2012)	Japan	8,620	13.7 (0.8)	Single question Y/N & coding of open response	12 months	F = 5.6% M = 1.1%	Odds Ratio = 5.58
		9,484	16.6 (1.0)			F = 6.9% M = 1.5%	Odds Ratio = 5.02
Kidger et al. (2012)	England	4,810	16.8 (2.9 mnths)	Single question Y/N	Lifetime	F = 25.6% M = 9.1%	Odds Ratio = 3.42
Moran et al (2012)	Australia	1,697	15.9	Single question Y/N	12 months	F = 6.5% M = 3.6%	Risk Ratio = 1.6
No Significant Gender Differences							
Hilt et al (2008)	U.S.	508	10-14	Single question Y/N	Lifetime	F = 8.1% M = 6.8%	X ² = 0.33 P > 0.05
Resch et al (2008)	Germany	1,681	11-17	Single question Y/N	6 months	Figures not reported	OR = 1.9 p = 0.072
Kirchner et al (2011)	Spain	1,171	13.96 (1.32)	Single question Y/N	12 months	F = 12.6% M = 10%	X ² = 0.81 p = 0.20
Borges et al (2011)	U.S.	1,004	14-18	Single question Y/N	12 months	F = 8% M = 7.1%	OR = 1.0

* = Standard Deviations and mean ages were not always reported within sample descriptions. ^a = Most common wording of the single question was 'I deliberately try to hurt or kill myself'.

Extracted data from the Deliberate Self-Harm group can be seen in Table 1. Before commenting on gender differences in prevalence, it is important to discuss the type of assessment tool employed by the studies. As highlighted by Muehlenkamp et al. (2012), the assessment tool employed can contribute to potential bias in the estimates of self-injury within the adolescent population. All of the studies within the DSH group relied on a single item assessment for self-injury; for example, a dichotomous Yes/No response to statements such as 'I

deliberately try to hurt or kill myself'. However, three of the included studies (Morey, Corcoran, Arensman and Perry, 2008; Portzky, De Wilde and van Heeringen, 2008; Watanabe et al., 2012), then asked participants to describe their most recent episode of self-harm and coded the response according to Madge et al.'s (2008) definition of DSH.

There were fourteen studies included within this group reporting findings from sixteen independent samples. Of these sixteen samples, twelve reported that females were significantly more likely to report a history of self-injurious behaviour than males. The four studies that failed to report a significant gender differences all described a trend in the expected direction. Furthermore, these samples represented four of the six smallest across the group (Range = 508-1,681). Consequently, they may have had insufficient power to detect significant gender differences. Careful evaluation of these four studies revealed additional characteristics which may help to explain their contrary findings. The populations of Hilt, Nock, Lloyd-Richardson and Prinstein (2008) and Kirchner, Ferrer, Forns and Zanini (2011) represented a younger age group than the majority; evidence suggests that gender differences become more marked as young people progress further into adolescents (Sourander et al., 2006). Furthermore, contrary to all other included studies, Resch, Parzer and Brunner (2008) relied on an interview format to gather their data. It may be this alternative method of data collection had a differential impact on the reported self-injury prevalence by gender.

1.4.4 Non-Suicidal Self-Injury – No Suicidal Intent

Table 2
Gender Prevalence of Non-Suicidal Self-Injury (No Suicidal Intent) in Adolescents

Significant Gender Differences							
Study	Country	Sample Size	Age Range M (SD)*	Assessment	Time Frame	Prevalence by Gender	Significant Difference?
Nixon et al. (2008)	Canada	568	14-21	Single question Y/N & coding of open response ^a	Lifetime	F = 24.3% M = 8.4%	$p = 0.001^f$
Muehlenhamp et al. (2009)	U.S.	1,393	15.48 (1.38)	SHBQ ^b ; Gutierrez et al. 2001) ^c	Lifetime	F = 26% M = 17%	$X^2 = 26.68$ $P < 0.001$
Hargus et al. (2009)	England	5,717	15-16	Single question Y/N ^c	Lifetime	F = 4.3% M = 1.5%	Odds Ratio = 3.8
Plener et al. (2009)	Germany	665	14.8 (0.66)	SHBQ; Gutierrez et al. 2001) ^c	Lifetime	F = 31.6% M = 17.5%	$X^2 = 16.86$ $P < 0.0001$
Sornberger et al. (2012)	U.S.	7,126	14.92 (1.61)	Single question Y/N ^c	Lifetime	F = 32.1% M = 16.6%	$X^2 = 231.93$ $P = 0.000$
Bakken & Gunter (2012)	U.S.	2,548	14-19	Single question Y/N ^d	12 months	F = 17% M = 9%	Sig. Diff. ^e
You et al. (2012)	Hong-Kong	2,435	14.63 (1.25)	Behaviour checklist	12 months	F = 27% M = 21.8%	$X^2 = 6.22$ $P = 0.013$
Giletta et al. (2012)	Italy	1,862	15.6 (1.08)	Behaviour checklist	6 months	Figures not Reported	$X^2 = 8.06$ $P = 0.004$
	Netherlands		15.83 (0.67)		6 months		$X^2 = 23.10$ $P = 0.001$
	U.S.		15.66 (0.56)		12 months		$X^2 = 8.42$ $P = 0.004$
Shek & Yu (2012)	Hong-Kong	3,328	12.59 (0.74)	DSBS ^b	12 months	Figures not reported	Odds Ratio = 1.32
Zetterqvist et al. (2012)	Sweden	3,060	15-17	SITBI ^b	Lifetime	Figures not reported	Risk Ratio = 1.6
Cheung et al. (2013)	Hong Kong	2,317	16.4 (1.6)	Single question Y/N ^d	12 months	F = 17.3% M = 10.3%	$X^2 = 21.16$ $P < 0.001$
No Significant Gender Differences							
Claes et al. (2010)	Belgium	150	15.56 (2.0)	Single question Y/N ^c	Lifetime	F = 43.4% M = 35%	$X^2 = 1.51$
Wan et al. (2011)	China	17,662	16.2 (2.82)	Single question Y/N ^d	Lifetime	F = 17.1% M = 16.9%	$P = 0.677^f$
Møhl & Skandsen (2012)	Danish	2,864	17	Single question Y/N ^c	Lifetime	F = 22.3% M = 18.9%	$P = 0.3^f$

* = Standard Deviations and mean ages were not always reported within sample descriptions. ^a = Most common wording of the single question was 'Have you ever harmed yourself in a way that was deliberate but not intended as a means to take your life?'.
^b = SHBQ = Self-Harm Behavior Questionnaire, DSBS = Deliberate Self-Harm Behavior Scale, SITBI = Self-Injurious Thoughts and Behaviors Interview. ^c = Exclusion of suicide intent using follow-up item. ^d = Exclusion of suicide intent at screening. ^e = Method of statistical analysis not reported. ^f = Chi-square analysis, x^2 not reported.

Extracted data from the Non-Suicidal Self-Injury – No Suicidal Intent group can be seen in Table 2. There were fourteen studies included in the NSSI-NSI group. Eleven of which relied on a single item assessment and the remaining three utilized a behavioural checklist. With regards to the exclusion of suicidal intent; six of the studies using a single item and all those

using the behavioural checklist, excluded at the screening stage; for example ‘have you ever harmed yourself in a way that was deliberate but not intended as a means to take your life?’ The remaining five single item assessments excluded participants based on a subsequent follow-up question such as ‘have you ever attempted suicide?’ or endorsement of the motive ‘I wanted to die’. These differing methodologies raise questions about how ‘the absence of suicidal intent’ is understood by the self-injury field and, perhaps most importantly, by adolescents whose responses we are interpreting.

The fourteen included studies reported results from sixteen independent samples. Of these sixteen samples, thirteen reported that females were significantly more likely to report a history of self-injurious behaviour than males. In findings that echo those discussed in relation to DSH, one of the studies which failed to reveal a significant gender difference reported a clear trend in the expected direction; mean lifetime prevalence of 25% for males and 43.4% for females (Claes, Houben, Vandereycken, Bijttebier & Meuhlenkamp, 2010). Given the size of the sample ($N = 150$), it is highly likely these findings would have reached significance if more participants had been included. In contrast, Wan, Hu, Hao, Sun and Tao (2011) sampled over 17,000 Chinese adolescents and yet failed to find a significant difference. This anomalous finding may represent a unique aspect of Chinese culture. However, it is interesting to note that particular forms of DSH, such as pinching, scratching, biting and cutting were significantly higher in girls than boys. Finally, there is little to distinguish the methodology of Mohl & Skandsen (2012) from the majority of studies that showed a clear preponderance of self-injury in females. It is possible that the relatively low response rate (53%) may have biased the findings. Alternatively, this study may provide support for the oft cited conclusion that there are no clear-cut results in relation to gender differences and the prevalence of self-injurious behaviour.

1.4.5 Non Suicidal Self-Injury – Behaviour

Table 3
Gender Prevalence of Non-Suicidal Self-Injury (Behaviour) in Adolescents

Significant Gender Differences							
Study	Country	Sample Size	Age Range M (SD)*	Assessment	Time Frame	Prevalence by Gender	Significant Difference?
Yates et al. (2008)	U.S.	1,281	14-19	FASM ^a (Lloyd, Kelley & Hope, 1997)	Past 12 months	F = 30.5% M = 22.8%	X ² = 11.76 P < 0.01
Lundh et al. (2011)	Sweden	992	13-15	DSHI-9r ^a (Gratz, 2009)	Past 6 months	F = 45.1% M = 37.9%	X ² = 5.1 P < 0.01
You et al. (2011)	Hong Kong	6,372	14.72 (1.94)	NSSIS ^a	Past 2 years	F = 16.5% M = 11.9%	X ² = 22.99 P < 0.001
Barrocas et al. (2012)	Hong Kong	2,579	14-15	Behaviour Checklist	Past 12 months	F = 29.2% M = 17.7%	X ² = 9.409 P = 0.002
Law & Shek (2013)	U.S.	2,579	11.6 (2.4)	SITBI	Past 12 months	F = 18.9% M = 5.1%	X ² = 44.37 P < 0.001
No Significant Gender Differences							
Bjärehed & Lundh (2008)	Sweden	175	14.1	DSHI-9r ^a (Gratz, 2009)	Past 6 months	F = 46.6% M = 33.3%	T = 0.87 P = 0.67
Cerutti et al. (2011)	Italy	240	16.47 (1.7)	DSHI ^a (Gratz, 2001)	Lifetime	Figures not reported	X ² = 0.18 P > 0.10
Baetens et al. (2011)	Belgium	251	16.41 (1.26)	SHI ^a (Sansone, 2006)	Lifetime	Figures not reported	No Sig. Diff. ^c
Gratz et al. (2012)	U.S.	1,931	11-18	DSHI-Youth ^a (Gratz, 2009)	Lifetime	F = 39% M = 38%	P > 0.01 ^d

* = Standard Deviations and mean ages were not always reported within sample descriptions. ^a = FASM = Functional Assessment of Self-Mutilation, DSHI = Deliberate Self-Harm Inventory, NSSIS = Non-Suicidal Self-Injury Scale, SHI = Self-Harm Inventory, ^c = Method of statistical analysis not reported. ^d = Chi-square analysis, x² not reported.

Extracted data from the Non-Suicidal Self-Injury - Behaviour group can be seen in Table 3. There are nine studies included in the NSSI-B group, all of which utilized checklists for a range of behaviours associated with NSSI including cutting, burning, scratching and carving words. There is considerable variability across the measures in terms of standardisation, number of items assessed (ranging from 4 – 17) and behaviours included. However, none of the studies specified that the behaviours must have taken place in the absence of suicidal intent. The one exception to this is the two studies utilizing the Deliberate Self-Harm Inventory - full and youth versions (Gratz, 2001, 2009). In both of these, the authors argued that only one behaviour could be used to end one's life (cutting) and therefore only asked participants whether they have cut themselves 'without intending to kill yourself'. However, the decision was made to include both of these within the NSSI-B group as suicidal intent was not excluded for the remaining behaviours.

The nine included studies reported results from the same number of independent samples. Of these nine samples, four reported that females were significantly more likely to

report a history of self-injurious behaviour than males. As a result, a significant proportion of studies assessing NSSI behaviours reported an absence of gender differences in the prevalence of self-injurious behaviour. Given that this finding is in contrast to much that has been previously reported, it seems helpful to hypothesise as to the absence of significant gender differences. Reflecting themes previously discussed, three of the four studies reported prevalence figures from samples of less than 300 participants. Furthermore, Bjärehed & Lundh (2008) identified how the trend for girls to report a higher prevalence of self-injurious behaviour was approaching significance.

As an alternative, it may be that the type of assessment tool is biasing our estimates of gender differences within the adolescent population across the groups. Of the studies utilizing single item assessments, nearly 80% found evidence of significant gender differences in the prevalence of self-injurious behaviour. In contrast, of the thirteen studies using behaviour checklists, just over 60% found the same difference. Consequently, it may be the case that the type of assessment is influencing our findings regarding the presence of gender differences in self-injury. This is perhaps unsurprising given the findings of Muehlenkamp et al. (2012) of a significantly higher prevalence estimates in studies using behaviour checklists relative to single item assessments.

1.4.6 Additional Salient Findings across Studies

A secondary aim of this study was to extract findings relevant to gender differences in the basic parameters of self-injurious behaviour: frequency, method and function. The majority of the included studies did not report results relevant to this question and, as a result, these findings are limited by the absence of replication.

1.4.6.1 Frequency of Self-Injury

There are mixed findings regarding gender differences and the frequency of self-injurious behaviour. Gratz et al. (2012) found that self-harming boys reported higher rates of frequent DSH than self-harming girls. Similarly, Mohl and Skandsen (2011) found that men who self-harm do so more frequently than women or self-harm. In contrast, Sornberger, Heath, Toste and McLour (2012) found that 23% of females reported that they ‘frequently’ engaged in the endorsed method of self-injury in comparison to 17.9% of males; a significant difference. However, reported by three of the included studies and therefore the most robust finding: an absence of significant gender differences in the frequency of self-injurious behaviour (Muehlenkamp, Williams, Gutierrez & Claes, 2009; Bjärehed & Lundh, 2008; Cerutti, Manca, Presaghi and Gratz, 2011).

1.4.6.2 Method of Self-Injury

The question of gender and the associated method of self-injury has been most widely investigated, with a relative consensus across the evidence base. Females are significantly more likely to self-injure by cutting; a finding that has been replicated by six of the studies included within the review. An arguably related method, carving words or marks, is also more prevalent in females than males (Cerutti et al., 2011; Law & Shek, 2013; Baetens, Barrocas, Hankin, Young & Abela, 2012). For males, five studies have found that either burning and/or punching are significantly more likely to be reported as methods of self-injury. Furthermore, Sornberger et al. (2012) found that males were more likely to self-injure on the chest, genitals or face. This is in contrast to female adolescents who were significantly more likely to injure their arms and legs.

Hypothesising as to the reasons behind such marked differences in the method of self-injury, You, Leung and Fu (2012) suggested chosen method may reflect differences in function of self-injury. They wondered if girls are more likely to internalise negative emotions and cutting and carving can be viewed 'acting-in' type of behaviours. In contrast, boys are more likely to displace their distress outwardly and punching in particular can be seen as an 'acting-out' behaviour. Related to this point, Sornberger et al. (2012) highlighted how the physical evidence of a punch to the face or chest may be seen as a result of a physical altercation with another. You et al. (2012) also suggested that boys are more likely to demonstrate physical toughness by self-hitting. Cutting may arguably be perceived as a more 'feminine' way to resolve negative affect (You et al., 2011). Sornberger et al. (2012) also noted how females tend to use methods that involve bleeding, they suggested that this may be an important factor for those who chose to self-injure by cutting or carving. Of importance for clinicians, both Sornberger et al. (2012) and Gratz et al. (2012) have commented how males can be at greater risk due to their tendency to injure themselves in more sensitive locations and as burning is one of the more severe self-injurious behaviours. However, Muehlenkamp et al. (2009) found no significant gender differences with regards to severity of injury.

1.4.6.3 Function of Self-Injury

Only three of the included studies chose to investigate self-reported functions of self-injurious behaviour by gender. Morey et al. (2008) described how boys were more likely to identify 'wanting to frighten someone' and 'to find out if someone really loved them' as a motive for their DSH than girls. In contrast, Kidger, Heron, Lewis, Evans and Gunnell (2012) reported that females were more likely than males to select desire to punish self and to gain relief from terrible feelings as reasons for their most recent self-harm episode. Reflecting the findings of

both Morey et al. (2008) and Kidger et al. (2012), Zetterqvist, Lundh, Dahlstrom & Svedin (2013) found that females were significantly more likely to endorse automatic functions such as 'to stop bad feelings' or 'to relieve feeling 'numb or empty'. Whereas males were more likely to choose 'superficial reasons' including 'I was curious' or 'because my friend was' (Kidger et al., 2012) or social functions: 'to avoid punishment' or 'to feel more a part of a group' (Zetterqvist et al. 2013). However, it is important to recognise that these findings are limited by an arguably reductionist methodology; adolescents are required to identify their motives from a pre-selected list. Consequently, gender differences in the function of self-injury may be better understood by qualitative investigation.

1.5 Discussion

The current study aimed to address a significant gap in our understanding of gender differences in the prevalence of self-injurious behaviour. Findings until this point had been largely inconsistent and reviews of the field had been hampered by a lack of a systematic methodology. Consequently, this study aimed to provide a comprehensive synthesis of all the available research commenting on self-injury and gender differences in adolescents. The challenges of synthesising a literature characterised by definitional issues and multiple methods of assessment were discussed and resulted in research findings being divided into three groups: DSH, NSSI-NSI and NSSI-B. However, as the results are roughly comparable, this suggests there are many shared features between self-injurious acts, independent of suicidal intent.

The primary conclusion from this analysis is that female adolescents are significantly more likely to report engaging in self-injurious behaviour than males. Studies which failed to report the presence of significant gender differences were often characterised by a trend in the expected direction, smaller sample sizes, a younger adolescent population and assessment via a behavioural checklist. When comparing females and males that self-injure, there appears to be no difference in the frequency with which they engage in their preferred methods; with females more likely to cut and males self-punch or burn. In a brief consideration of the function of self-injury, females appear to be more motivated by the possibility of affect regulation, whereas males seem to endorse more social motivations.

1.5.1 Understandings Gender Differences

The conclusions of this review suggest that female adolescents are significantly more likely to *report* engaging in self-injurious behaviours. However, it is important to note that this does not necessarily mean that there is in a real gender difference in the rates of self-injury. For example, male reporting may be influenced by social understandings of self-injury as a

‘female behaviour’ (Muehlenkamp, 2009; Sornberger et al. 2012). This hypothesis is strengthened by the findings of gender differences in the method of self-injury. Arguably, self-injury is identified as a ‘female behaviour’ since cutting is seen as the prototypical form (Whitlock et al., 2011). As a result, when asked an open question about deliberate harm to self, males may be reluctant to respond positively for fear of appearing emasculated. For example, Borges et al. (2011) found that the 18.6% of participants that failed to complete the section on self-injury were male. In addition, given the typical social understanding of self-injury as a female cutting behaviour, males may be unlikely to consider self-punching or burning as a method of deliberate harm to self. This assumption is supported by the reduced presence of gender differences when self-injury was assessed via a behavioural checklist; in this case the behaviours of interest are clearly specified. In an effort to reduce the presence of a possible assessment bias, the self-injury field needs to refine their assessment process and to encourage research into male adolescents’ understanding of self-injury.

However, it is likely that even with the presence of an assessment bias; there is also a true gender difference in the prevalence of self-injurious behaviour. This introduces the following question: why is self-injury more prevalent in female adolescents? Reviewing discussion points from the included studies and the wider theoretical literature has led to the following theoretical proposition. Firstly, a number of included studies highlighted how the risk for self-injury is dependent on pubertal stage (Kidger et al., 2012; Moran et al., 2012). This supports the findings of Patton et al. (2007) who found a clear association with pubertal stage and self-injury, with the relationship being all the more striking in females. Furthermore, evidence from Moran et al. (2012) and Hawton and Harriss (2008) suggests that the sex ratio in self-injury decreases with age, or as puberty reaches completeness. Consequently, the increased prevalence in female adolescents may therefore be due to the particular impact of puberty on females. There are multiple potential stressors for females around puberty including changes in relationships and sex roles, increasing academic demands and sensitivity to physical appearance and body image.

In a closely related finding, a number of researchers have proposed that the higher prevalence of self-injury in females may be attributed to mediating variables such as depressive mood symptoms (Kvernmo & Rosenvinge, 2009) and increased psychological distress (Landstedt & Godin, 2011). This low mood and stress may arguably be a result of the increasing demands associated with pubertal stage. For example, Wichstrøm and Rossow (2002) reported that the higher rates of self-harm in girls are attributable to risk factors such as depressed mood and romantic involvement. It seems the level of psychological distress in females may also be increasing as a result of broader changes in identity and in negotiating the cultural norms of femininity (West & Sweeting, 2003). Consequently, in response to increasing psychological

distress associated with puberty, it is arguably more likely that females will engage in self-injury due to gendered socialization experiences. As highlighted by Shek and Yu (2012) males are taught to direct conflict externally, females internally. This hypothesis is tentatively supported by the finding of clear gender differences in both the method and function of self-injury. Arguably, girls and boys are socialised differently into what constitutes acceptable and unacceptable ways of coping with problems (Bowen & John, 2001). In summary, it is likely that even once an assessment bias has been accounted for, the prevalence of self-injury will be higher in female adolescents than males. One theoretical explanation for this difference may be the psychological impact of puberty for young females and the gendered messages society offers as to how to cope with the associated distress.

1.5.2 Recommendations for Future Research

There is much that the self-injury field still has to understand regarding gender differences in self-injurious behaviour. As such, there are innumerable recommendations that could be made regarding future research questions. However, based on the findings and conclusions from this review, there are three key areas where further empirical research is desperately needed.

Firstly, echoing the conclusions of Muehlenkamp et al. (2012), the self-injury field needs to reach a consensus concerning a global definition of self-injurious behaviour and an associated assessment measure. Until this time, we are limited in our ability to compare findings across studies, countries and cultures. In particular, a key question for exploration is whether there are gender differences in the behaviours adolescents associate with ‘hurting yourself on purpose’ or ‘deliberate harm to self’; such findings may have important implications for the use of single question assessment tools. Furthermore, it is crucial we advance our understanding of the concept of ‘suicidal ideation’: how it is understood by young people, whether it is valid to consider it a dichotomous variable and the value of grouping individuals on the basis of its presence or absence. The self-injury field is contributing much to our understanding of the qualitative and phenomenological differences which distinguish suicidal from non-suicidal self-injurious behaviour (Muehlenkamp & Kerr, 2010). However, further work is necessary to determine a valid way of measuring suicidal intentions utilizing quantitative methodology. As highlighted by Kidger et al. (2012), the distinction made between those who wanted to die and those who did not during the most recent self-harm act, is not equivalent to a distinction between suicide attempts and NSSI.

Secondly, preliminary conclusions from this review suggest that self-injury may serve different functions for adolescents dependent on gender. Further research, both quantitative and

qualitative in nature, is required to establish whether true differences exist. In particular, the self-injury field lacks understanding of the function of self-injury in males as, until the beginning of this century, much of the findings were based solely on female populations. Finally, findings from this review and the wider empirical literature have led to a hypothesis that there may be a relationship between pubertal stage, psychological distress and self-injury, and that such a relationship may differ by gender. This hypothesis offers a fascinating avenue for future research enquiry and, at the very least, researchers investigating risk factors and psychosocial correlations of self-injurious behaviour should ensure that they examine their findings separately by gender.

1.5.3 Clinical Implications of Findings

The findings of this review have implications for clinicians working in self-injury prevention, assessment and intervention. It is clear that programmes aiming to prevent adolescents from engaging in self-injury need to target the period prior to puberty. For females in particular, the onset of puberty seems to be associated with increased psychological distress and, for a significant proportion of adolescents; self-injury appears to be a socially acceptable solution to this distress. Helping young females prepare for the challenges of puberty and teaching them alternative means of coping with distress must be seen as a crucial step in promoting good mental health in schools.

Secondly, clinicians assessing adolescents for the presence of self-harm must be aware that a number of young males are engaging in behaviours which may not be traditionally understood as 'self-injury'. As such, young people should be questioned specifically about burning and self-punching. Clinicians have a responsibility to change the discourse around self-injury being a 'female behaviour' to try and encourage more male adolescents to seek support. Finally, as there is preliminary evidence that the motivations for self-injury may differ by gender, clinicians should be conscious to tailor their interventions to each individual. For example, supporting young people who self-injure in order to regulate their emotional experiences is likely to be different experience to supporting those who self-injure in order to feel accepted into a group or for the sake of curiosity.

1.5.4 Strengths and Limitations of Search Strategy

While the current study is a useful addition in understanding gender issues in self-injurious behaviour, its limitations need to be considered. Firstly, contrary to published guidance on systematic review methodology, the process of identifying the included studies and extracting the relevant data was carried out by one individual. This may have introduced an

element of bias and could therefore question the reliability of the findings. In order to mediate these concerns, the methodology was carefully constructed to be as transparent as possible with clearly defined inclusion and exclusion criteria. Nevertheless, replication of this study is strongly recommended within future years. Secondly, we limited studies to those written in English; as a result certain published studies were excluded adding an element of cultural bias. However, it is noteworthy that the broad definition of self-injurious behaviour employed by the review encouraged inclusion of studies across the globe, including a number from Eastern cultures. Furthermore, we are limited by the dearth of research within developing countries and, in order to gain a comprehensive and global picture of self-injurious behaviours among adolescents, research with such populations is desperately needed.

Thirdly, although the included studies were grouped according to assessment method and exclusion of suicidal intent, there are multiple methods of division and considerable variation within each group. Consequently it is possible that, given the same collection of studies, a different reviewer would have divided them according to different criteria and this is reflective of the variability within the self-injury field. In an attempt to overcome this limitation, the method of division was made as explicit as possible. The strengths of this review include the comprehensive search strategy, including electronic databases and reference mining, in an attempt to identify all relevant studies. Furthermore, this study should be recognised as an important first step in an attempt to review a unique question in a field characterised by definitional challenges.

Conclusion

In conclusion, this study is the first to systematically review gender differences in the prevalence of self-injurious behaviour. Results suggest that female adolescents are significantly more likely to report having engaged in self-injury than males. However, it is unclear whether this finding reflects a gender bias in how self-injury is assessed, or whether there is a true difference in self-injury rates. Gender differences were also reported in both the method and function of self-injury. Future research is required to better understand gender differences in both the prevalence and basic parameters of self-injurious behaviour; our conclusions are currently limited by both the variation in the definition and assessment of self-injury.

Chapter 2: Empirical Paper

Emotion Dysregulation and Alexithymia as Mediators of the Relationship between Attachment and Deliberate Self-Injury; an Exploration of Gender Differences

2.1 Introduction

Self-injurious behaviours are associated with long-term negative consequences for social, emotional and physical wellbeing (Wilkinson & Goodyer, 2011). For example, following deliberate self-injury individuals can be left with complex feelings of guilt and shame (Briere & Gil, 1998) and this may serve to increase their negative emotional arousal in the long term (Gratz, 2003). Furthermore, individuals with histories of self-injury are at greater risk of suicide attempts (Hamza, Stewart & Willoughby, 2012). In order to inform both the treatment and prevention of self-injurious behaviour, it is necessary to develop a comprehensive understanding of the associated aetiological factors.

The term self-injurious behaviour encompasses a wide spectrum of behaviours and there is ongoing variability in the definitions and assessment measures employed within the literature (Andover, 2012). For the purpose of this study, self-injurious behaviour is defined 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’ (Gratz, 2001, p.253). With regards to self-injury prevalence, there is considerable variability across samples dependent on age, gender and method of assessment. However, in an attempt to establish a global and systematic perspective on the prevalence of self-injurious behaviour in adolescents, Meuhelenkamp et al. (2012) reported mean lifetime prevalence rates of between 16-18%. Similarly among college students, lifetime rates have been reported as 17% (Whitlock, Eckenrode & Silverman, 2006). These figures demonstrate the widespread nature of self-injury, underscoring the importance of developing an accurate understanding of the aetiology of this behaviour.

2.1.1 Emotion Regulation and Self-Injurious Behaviour

Klonsky (2007) reviewed the empirical research on the functions of self-injury and, based on the findings that negative affect precedes self-injury and decreases thereafter, concluded that self-injury serves an emotion regulation function. Furthermore, when questioned

as to their motives for self-injury, most self-injurers identified the desire to alleviate negative affect. The emotion-regulating function of self-injury has also been articulated in a number of theoretical works (Nock & Prinstein, 2004, 2005; Chapman, Gratz & Brown, 2006), including Linehan's biosocial theory (1993). Specifically, Linehan suggests a biologically-based vulnerability to intense emotionality, in combination with an invalidating environment where the child fails to learn effective emotion regulatory strategies, places individuals at risk for later self-injury. Without the necessary skills to manage intense emotional distress, these at-risk individuals are more likely to depend on maladaptive strategies such as self-injury to regulate negative arousal.

There is increasing empirical evidence in support of the emotion regulation function of self-injury. Armeij, Crowther and Miller (2011) examined in vivo changes of affect associated with real-world self-injurious behaviour. They found that participants reported a significant increase in negative affect prior to self-reported self-injury, followed by a decrease in negative affect after the event. Furthermore, in controlled laboratory conditions, Weinberg and Klonsky (2012) discovered that self-injurers reported a greater reduction in negative arousal following self-administration of a strong shock, when compared to non-injuring controls. They went on to outline potential mechanisms underpinning this finding: firstly, that shock serves to distract from the emotional arousal, or the release of endorphins as a result of the self-injury serves to reduce the negative affect.

Given the evidence that self-injury functions to regulate overwhelming emotions, it could be suggested that emotion regulation difficulties serve as an individual risk factor in the development of self-injurious behaviour (Gratz, 2003). Gratz and Roemer (2004) conceptualise emotion regulation as a multi-dimensional concept involving awareness, understanding and acceptance of emotions, the ability to control impulsive behaviours in response to negative emotions and the use of contextually appropriate emotion regulation strategies. Consequently, individuals with emotion regulation deficits may have difficulties in each or all of the dimensions described above. In relation to self-injury, evidence suggests that deficits in understanding, expressing and regulating emotions are associated with self-injurious behaviour (Klonsky & Muehlenkamp, 2007). Furthermore, in a study of undergraduate females in the United States, Gratz and Roemer (2008) found that overall emotion dysregulation successfully differentiated women reporting frequent self-injury from those with no history of self-injury, above and beyond other hypothesised risk factors. Specifically, two particular dimensions were particularly relevant in predicting self-injury status; *limited access to emotion regulation strategies* and *lack of emotional clarity*. Similarly, *limited access to emotion regulation strategies* has been calculated to have moderate diagnostic accuracy in detecting the presence of self-injury in a sample of adolescent inpatients (Perez, Vanta, Garnaat & Sharp, 2012). In

summary, there appears to be empirical consensus about the relationship between emotion dysregulation and self-injury, although our conclusions are somewhat limited by the absence of longitudinal research.

Researchers have gone on to highlight how a critical aspect of emotion regulation that is particularly relevant to self-injurious behaviour, is the ability to identify and express emotional experiences (Paivio & McCulloch, 2004). The construct of alexithymia is a means of capturing deficits in such skills and has been defined by Taylor et al. (1999) as consisting of the following features: difficulty identifying and distinguishing among feelings and bodily sensations, difficulties labelling and communicating emotional experience, and externally oriented thinking. It could be hypothesised that individuals who score highly on an alexithymia construct may be more likely to self-injure; the ability to differentiate and express emotional experiences is arguably a precursor to the ability to successfully modulate their emotional experiences. Without these skills, self-injury may serve as a viable alternative. This proposition is supported by empirical evidence which suggests that alexithymia is independently associated with self-injury (Zlotnick et al., 1996), and that the *difficulty identifying feelings* subscale seems particularly important in understanding this association (Lambert & deMan, 2007; Borrill, Fox, Flynn & Rodger, 2009). In conclusion, theoretical and empirical evidence asserts that a key function of self-injurious behaviour is to regulate emotional experiences. Consequently, individuals who have difficulty understanding and regulating their emotions (i.e. those who score highly on measures of emotion dysregulation and alexithymia), are more likely to self-injure.

2.1.2 Attachment and Emotion Regulation

Arguably the most important conceptual framework for understanding individual differences in emotion regulation is attachment theory (Bowlby, 1982/1969, 1973). As stated by Mikulincer, Shrauer and Pereg (2003, p.79), ‘attachment-figure availability is one of the major sources of variation in strategies of affect regulation.’ Research suggests that in response to the degree of availability, sensitivity and responsiveness of carers, infants display different patterns of attachment behaviour (Ainsworth, Blehar, Waters & Wall, 1978). Securely attached children are confident to explore and adaptively use their available caregiver for comfort at times of distress. In the context of this relationship they learn constructive ways of coping with emotional experiences; for example how to restore emotional equanimity without creating negative socio-emotional side effects (Epstein & Meier, 1989). In support of this, Waters et al. (2010) found that securely attached children had a greater understanding of negative emotions and were more likely to converse about negative experiences. In contrast, where the attachment-figure is unavailable or unresponsive, the child is likely to develop an insecure attachment style

to maximise the changes of getting their needs met. Crucially, evidence also suggests that these early attachment experiences are associated with adult attachment styles (Waters, Merrick, Treboux, Crowell & Albersheim, 2000). Brennan, Clark and Shaver (1998) propose that attachment insecurity is best conceptualised in a two-dimensional space: *attachment anxiety* and *attachment avoidance*. A high score on a measure of attachment anxiety suggests that the individual worries that others may not always be available for them, therefore they are more likely to become frustrated when their attachments needs are not met. In contrast, individuals that appear indifferent to relationships and avoid becoming dependent on others are more likely to score highly on the measure of avoidant attachment. As such, how adults respond within their current relationships offers us important information about their earliest attachment experiences and, as Mikulincer et al. (2003) go on to illustrate, about their ability to regulate emotional experiences.

The relationship between attachment style and strategies of emotion regulation is best illustrated by Shaver and Mikulincer's integrative model of the activation and dynamics of the attachment system (Shaver & Mikulincer, 2003; Mikulincer et al., 2003). This model asserts that individuals with an anxious attachment style tend to over-depend on others as a means of regulating their distress; as such they tend to intensify negative emotional responses and perceive themselves as incompetent at affect regulation. In support of this assertion, evidence suggests that people who score highly on attachment anxiety respond to stressful events with intense distress (Mikulincer & Florian, 1998) and have ready access to painful memories (Mikulincer & Orbach, 1995). In contrast, Mikulincer et al. (2003) claim that individuals with an avoidant attachment style strive for self-reliance and independence; as such they are likely to suppress thoughts that evoke distress. Research has shown that attachment avoidance is associated with suppression of painful thoughts and a failure to acknowledge negative emotions (Fraley & Shaver, 1997; Mikulincer & Orbach, 1995). Furthermore, in a recent study involving early adolescents, Brenning and Braet (2013) found that anxious attachment was related to dysregulation of sadness, whereas avoidant attachment was associated with suppression of sadness.

In relation to the alexithymia construct, Montebanocci, Codispoti, Baldaro and Rossi (2004) highlight how a number of theorists have posited that the origins of alexithymia lie in childhood, notably the mother-infant relationship. This claim receives empirical support from various sources; for example evidence suggests that perceived difficulty in articulating feelings is associated with poor parental bonding among college students (Fukunishi, Sei, Morita & Rahe, 1999). Furthermore, associations between alexithymia and insecure attachment have been demonstrated in clinical and non-clinical populations (Troisi, D'Argenio, Peracchio, and Petti, 2001; Picardi, Toni & Caroppo, 2005). In a recent study of female adolescents, Oskis et al.

(2013) found that, when compared to securely attached participants, the insecurely attached groups showed higher levels of alexithymia. Specifically, an avoidant attachment style predicted difficulties describing feelings, Oskis et al. (2013) wondered whether this relationship was explained by the reduced opportunities to share emotional experiences with others. In contrast, an anxious attachment style predicted difficulty identifying feelings and the authors hypothesised this was related to the over-activation of emotional experiences. In summary, it is clear that early attachment experiences are important in the development of emotion regulation skills, including the features associated with alexithymia. Individuals with an insecure attachment style have more difficulties in managing their emotional experiences, although the specific relationships may differ depending on identified attachment style. As such, in this study the hypothesised predictors; anxious and avoidant attachment, were examined separately.

2.1.3 Attachment and Self-Injurious Behaviour

A secure attachment style is associated with positive psychological outcomes and improved emotional self-regulation and self-reflective capacities (Sroufe, 2005; Fonagy, 2001). As a result, a secure attachment is a protective factor; promoting resilience and improving outcome. In contrast, an insecure attachment style is associated with symptoms of psychopathology and reduced psychosocial functioning throughout the life span (Sroufe, 2005). In relation to self-injurious behaviours, within a clinical sample Marchetto (2006) found that participants who disclosed a history of repetitive skin-cutting, recorded significantly higher scores for both maternal and paternal overprotection and lower maternal care scores than those without a history of self-injury. However, Marchetto (2006) went on to hypothesise that any potential relationship between dysfunctional caregiving and later skin-cutting is likely to be indirect and complicated by mediating factors.

Evidence also suggests that a disrupted attachment history is related to suicidality (Van der Kolk, Perry & Herman, 1991). For example, Stepp et al. (2008) examined the relationship between attachment style and categories of suicide related behaviours in a predominantly psychiatric sample. They found that anxious attachment increased the risk for self-injury, suicide attempts and their co-occurrence; in contrast, avoidant attachment was associated only with the co-occurrence of self-injury and suicide attempts. In a similar design, Gormley and McNiel (2010) reported that psychiatric patients with higher levels of attachment anxiety were significantly more likely to report a history of self-injury. However, high scores on a measure of attachment avoidance was not a significant indicator of self-injury history. This suggests that the insecure attachment as a risk factor for self-injurious behaviour may depend on the specific attachment style. There is also evidence to suggest that insecure attachment may serve as a risk factor for self-injury among a non-clinical college population (Gratz, 2002). In summary,

insecure attachment, and in particular an anxious attachment style, is associated with self-injury among both clinical and non-clinical populations. However, there is limited empirical understanding of how and why these two variables may be related.

2.1.4 Mediated Pathways

Research analysing theoretical path models to self-injury involving mediated relationships has only recently begun to emerge. Of particular relevance, few studies have examined the mediating role of emotion regulation to explain the relationship between attachment insecurity and psychological distress (Tasca et al. 2009). Based on the literature reviewed thus far, we could anticipate that individuals with an insecure attachment style will experience more difficulties in understanding and regulating their emotions. Given the affect regulation function of self-injury, such a history will arguably place these individuals at greater risk of engaging in self-injury, which may serve as a maladaptive emotion regulation strategy. There are clear parallels between this interpretation of the literature and the previously discussed biosocial theory (Linehan, 1993). In accordance with the above, Kimball and Diddams (2007) found that insecure adult attachment style was related to both the variability of method and the frequency of self-injurious behaviour, and that this relationship was mediated through specific negative emotion regulation strategies. These findings directly correspond to the predicted model of this study, however are limited by a relatively small sample size of 216, of which only 9% were categorised as having self-injured. Furthermore, the authors failed to account for the possible effects of gender and commented on the need for future research to explore the presented model in greater detail. In closely related studies, Buckholdt, Parra and Jobe-Shields (2009) showed that parental punishment and neglect of sadness placed individuals at greater risk for self-injury by fostering negative evaluations of emotional experiences, and a belief that nothing can be done to effectively manage emotions. Similarly, Adrian, Zeman, Erdley, Lisa and Sim (2011) found that family relational problems were indirectly related to self-injury through emotion dysregulation in hospitalised female inpatients.

With specific reference to emotion regulation and alexithymia, research has shown that emotion dysregulation mediates the relationship between adult attachment style and symptoms of depression, generalised anxiety disorder and eating disorders (Marganska, Gallagher & Miranda, 2013; Tasca et al., 2009; Kullik & Petermann, 2013). As such, insecurely attached individuals are at greater risk for symptoms of psycho-pathology, and this relationship can be understood as resulting from deficits in emotion regulation skills. Furthermore, alexithymia acted as a mediator in the relationships between childhood trauma and self-injury (Paivio & McCulloch, 2004) and bullying and self-injury (Garisch & Wilson, 2010). In summary, there is robust evidence to suggest that emotion dysregulation may mediate the relationship between

attachment style and self-injury. There are less robust findings in relation to alexithymia; however the concept is theoretically plausible.

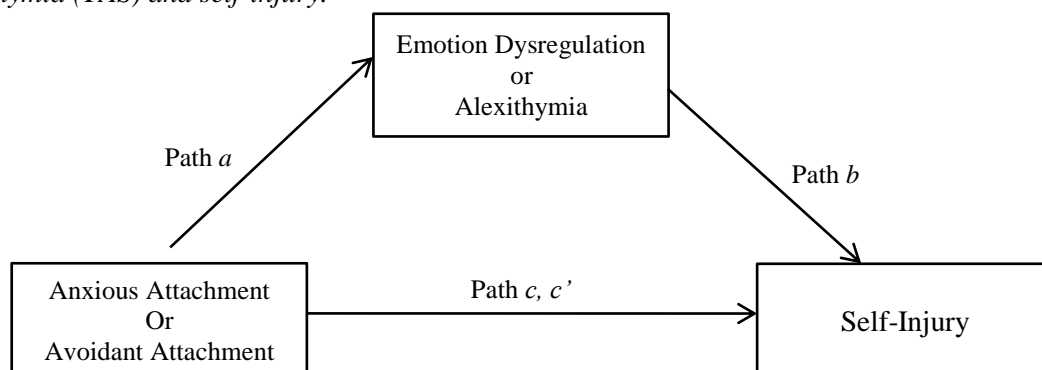
2.1.5 Gender Differences

Evidence suggests that gender differences may exist in the prevalence, method and function of self-injurious behaviour (Whitlock et al., 2011; Zetterqvist et al., 2013). With respect to the explanatory variables, there is limited research exploring gender differences in emotion regulation skills, however there are significant gender differences in alexithymia (Levant, Hall, Williams & Hasan, 2009) and attachment style (Del Giudice, 2011). For example, in a meta-analysis of romantic attachment based on 112 samples from various countries, Del Giudice (2011) revealed the presence of gender differences, with men reporting greater levels of avoidance attachment and less attachment anxiety than women. Furthermore, Levant et al. (2009) meta-analysed the alexithymia literature and found a small but statistically significant gender difference with men exhibiting higher levels of alexithymia. Finally, Gratz (2003) argued that, given evidence suggesting the presence of gender differences in the risk factors for self-injury, future research should systematically examine the effects of gender. As such, the findings of the current study are presented separately by gender.

2.1.6 The Current Study

The conceptual model on which the current study is based is depicted in Figure 2. As shown, it was hypothesised that both anxious and avoidant attachment would be associated with self-injury (path *c*). It was also anticipated that this relationship would be mediated by alexithymia and difficulties in regulating emotions (paths *a* and *b*).

Figure 2
Mediation model for attachment insecurity (ECR-R), emotion dysregulation (DERS), alexithymia (TAS) and self-injury.



Path *a* = relation between attachment insecurity and mediator, Path *b* = relation between mediator and self-injury, Path *c* = attachment insecurity to self-injury relation (direct effect), Path *c'* = attachment insecurity to self-injury relation, through the mediator.

The research in relation to gender differences is largely exploratory as self-injury, emotion dysregulation, alexithymia and attachment have yet to be investigated in separate models by gender. However, given that much of the literature in self-injury is based on female populations and evidence suggests gender differences in both the prevalence and function of self-injury, it is anticipated that the models are likely to differ by gender.

In summary, this study aims to contribute to the current literature by empirically testing a theoretical model using statistically advanced mediational techniques. Furthermore, we are aiming to draw together a number of hypothesised pathways to improve our overall understanding of the risk factors and potential function of self-injury. In relation to clinical relevance, identifying what differentiates self-injuring individuals, and self-injury related vulnerabilities, is crucial in the targeting and development of effective interventions.

2.2 Method

2.2.1 Participants

Three hundred and eighty two participants were recruited through two sources: the psychology department at a university in the South of England and via adverts on the social media site, Facebook. Students from the school of psychology received research credits in return for their participation and the remainder an opportunity to win a high street voucher. In order to calculate the necessary sample size to achieve adequate power when testing for mediation, a variety of sources were consulted. These included papers using similar methodologies (Weierich & Nock, 2008; Garisch & Wilson, 2010) and an article by Fritz and MacKinnon (2007) which offered guidelines for researchers in determining the sample size necessary to conduct mediational studies with .8 statistical power. Based on effect sizes of 0.26 for the path between the independent and mediator variable and the path between the mediator and dependent variable, Fritz and MacKinnon (2007) recommend a minimal sample size of 148. However, on the basis of previous research, and with the potential to analyse gender separately, we aimed to recruit 400 adults.

Three hundred and seventy adults aged 18-58 (mean age = 22.54 years, $SD = 5.91$) completed all the measures and were therefore included in the current analyses. Twelve participants were excluded from the analysis; 1 due to a failure to indicate their gender and 11 who only completed 3 of the 4 measures. There were no significant differences between those included in the analysis or those that were excluded in terms of age, gender or reported prevalence of self-injury. The sample consisted of 213 females (57.6%) and 157 males (42.4%). 80.6% of the participants identified their ethnicity as White-British, followed by any other

White background (6.5%) and Chinese (2.7%). The remaining 10.2% represented participants from diverse ethnic backgrounds including Black, Asian and Mixed.

2.2.2 Measures

The standardised measures described below were used to operationalize the identified variables of interest; deliberate self-injury, attachment, alexithymia and emotion dysregulation. Participants also completed a range of demographic questions.

Deliberate Self Injury. The Deliberate Self-Harm Inventory (DSHI; Gratz, 2001), is a 17-item scale that measures frequency, severity, duration and type of self-harming behaviour (defined as the deliberate, direct destruction of body tissue without suicidal intent). Specifically, the DSHI asks participants whether and how often they have engaged in a variety of behaviours ‘intentionally, or on purpose, (without intending to kill yourself)’. In a preliminary study using undergraduate students, the DSHI has been shown to have high internal consistency and adequate test-retest reliability (Gratz, 2001). In the same sample, adequate construct, convergent and discriminant validity has also been demonstrated. An altered version of the DSHI was used in the current study to increase speed and clarity of responding. In line with the adaptations described by Kimball and Diddams (2007), redundantly worded items and forms of deliberate self-harm not endorsed in previous research were eliminated, for example ‘burning with a cigarette’ and ‘burning with a lighter or match’ were combined. Furthermore, evidence suggested that removal of unusual forms of self-harm, for example ‘dripping acid on skin’ was unlikely to diminish internal consistency (Gratz, 2001). As such, the included version of the DSHI assessed 11 self-report items.

Consistent with previous studies (e.g. Cerutti et al. 2011; Klonsky, Oltmanns & Turkheimer, 2003), a dichotomous self-injury variable was created by assigning a score of ‘1’ to participants who reported having engaged in any of the behaviours on the DSHI, and a score of ‘0’ to those who did not. Thus creating two self-injury groups: self-injury and no self-injury. Furthermore, two additional continuous variables were created: the number of reported methods of self-injury and the frequency of reported self-injury (sum of participants’ scores on the frequency questions for each of the 11 items). Finally, and consistent with Cerutti et al. (2011), a dichotomous DSH variable was created by distinguishing occasional self-injuring individuals (frequency five or less) from those with repetitive self-injury (i.e. six or more times).

Attachment. The Experiences in Close Relationships Revised (ECR-R, Fraley, Waller, Brennan, 2000) is a 36-item self-report attachment measure with a 7-point Likert-type response format ranging from 1 (disagree strongly) to 7 (agree strongly). The *Attachment Avoidance* subscale (18 items) assesses discomfort with closeness and fear of intimacy and the *Attachment*

Anxiety subscale (18 items) is concerned with fear of rejection and abandonment, higher scores represent greater levels of attachment anxiety or avoidance. The ECR has been shown to have good retest-reliability (Sibley & Liu, 2002) and adequate external validity in a general population sample (Conradi, Gerlsma, van Duijn & De Jonge, 2006). The coefficient alphas in this sample were 0.94 for the Anxiety subscale and 0.96 for the Avoidance subscale.

Alexithymia. The Toronto Alexithymia Scale (TAS-20, Bagby, Taylor & Parker, 1994) is a 20-item self-report measures with items rated from 1 (*‘strongly disagree’*) to 5 (*‘strongly agree’*). Higher scores indicate greater difficulty identifying and communicating feelings, and externally orientated thinking (e.g. ‘I prefer to just let things happen rather than to understand why they turned out this way’). It has three subscales: *Difficulties Identifying Emotions*, *Difficulties Describing Feelings* and *Externally-Oriented Thinking*. Higher scores represented individuals with higher alexithymia. Previous studies have provided strong support for the reliability and factorial validity of the TAS-20 (Parker, Taylor & Bagby, 2003). The coefficient alpha in this sample was 0.86.

Emotion Dysregulation. The Difficulties in Emotion Regulation Scale (DERS, Gratz & Roemer, 2004), is a 36-item self-report questionnaire which assesses characteristic patterns of emotion dysregulation. It has six subscales: *Non-acceptance of Emotional Experiences*, *Difficulties Engaging in Goal Directed Behaviour*, *Impulse Control Difficulties*, *Lack of Emotional Awareness*, *Limited Access to Emotion Regulation Strategies* and *Lack of Emotional Clarity*. Higher scores represented individuals with more difficulties in emotion regulation. Preliminary findings suggest that the DERS has high internal consistency, good test–retest reliability, and adequate construct and predictive validity (Gratz & Roemer, 2004). The coefficient alpha in this sample was 0.95.

2.2.3 Procedure

Approval for this research was obtained from the University Ethics Committee. Participants accessed all of the standardised questionnaires online via iSurvey which is a survey generation and research tool available to University members. At the onset of the survey, participants were fully informed about the purpose of the study, as well as the potentially distressing subject matter. They were advised not to participate in the study if they find the subject matter distressing or if they are currently having difficulty not hurting themselves in some way. At the cessation of the survey, a full debrief was provided including a mood repair task and contact information on resources and support sources available at a local and national level.

2.2.4 Analysis Strategy

Statistical analysis was carried out using IBM SPSS Statistics 21. Firstly, in order to determine whether the measured variables met the assumptions of normality, the shape of the distribution and value of the skewness and kurtosis statistics for each variable was examined by gender. All the variables met the required assumptions, aside from the number of methods of self-injury which was subsequently treated with square root transformation. This transformation effectively normalised the data and was used in subsequent analysis. Descriptive statistics were calculated for all study variables on the basis of gender and self-injury group: self-injury or no self-injury. Pearson's chi-square test and independent samples t-tests were employed to explore basic relationships between the variables. Zero-order correlations were then examined between self-injury group, attachment, alexithymia and emotion dysregulation using Pearson's correlation and the point biserial correlation coefficients. Furthermore, to assess whether self-injurers differed on the variables of interest when compared to their non-self-injuring peers, both analysis of variance (ANOVA) for total scores and multianalysis of variance for subscales (MANOVA) were conducted. Self-injury status and gender served as the independent variables, while anxiety and avoidance scores on the ECR-R and total and subscale scores on the DERS and TAS served as dependent variables.

There is a range of opposing views in the literature as to the choice method of mediational analysis. For example, the most common method is the causal steps approach described by Baron and Kenny (1986). However Hayes (2013) has criticised this method due to its reliance on hypothesis tests, consequently no formal quantification of the indirect effect is reported and the approach suffers due to low statistical power. Furthermore, MacKinnon, Fairchild and Fritz (2007) described a phenomenon known as inconsistent mediation where mediation may occur even if the original association between the independent and dependent variable is not significant. As an alternative, bootstrapping has become widely used as it provides an approximation of the sampling distribution, allowing for violations of assumptions of normal distribution shape and yielding inferences that are more likely to be accurate when compared to a normal theory approach (Hayes, 2013). Furthermore, research suggests this method is statistically more powerful than Baron and Kenny's approach (Mackinnon et al., 2007). Consequently, mediation effects were calculated using PROCESS, a versatile modelling programme for SPSS written by Andrew Hayes (2013). A variety of models were examined separately by gender with attachment anxiety or avoidance as predictors, measures of alexithymia and emotion dysregulation as mediators and presence of self-injury as a dichotomous outcome variable. Before testing each model, the usual assumptions of ordinary least squares regression were checked including homoscedasticity and independence of

residuals. The statistical inference for the indirect effect was calculated using a bias-corrected bootstrap confidence interval based on 10,000 bootstrap samples.

2.3 Results

2.3.1 Descriptive and Correlational Analyses

Findings indicated that 50.8% ($n = 188$) of participants reported a lifetime prevalence of self-injury. There was no significant association between gender and the presence of self-injury, $\chi^2(1) = 0.461$, $p = .497$ with 52.9% ($n = 83$) of males reported having self-injured in comparison to 49.3% ($n = 105$) of females. There were notable similarities in choice of self-injury, as can be seen in Table 4, with the most common methods of injury across both genders including cutting, carving marks into one's skin, severely scratching self and sticking sharp objects into your skin. There were no significant differences in self-injury method by gender, aside from cutting $\chi^2(1) = 14.20$, $p < .001$, and carving marks into skins $\chi^2(1) = 4.30$, $p < .05$, which females were more likely to endorse. Furthermore, females reported engaging in a greater variety of self-injury methods ($M = 2.89$) than males ($M = 2.12$), $t = -3.02$, $p = 0.003$ and were more likely to have self-injured five times or more (71.4%) in comparison to males (55.4%), $\chi^2(1) = 0.34$, $p = 0.034$.

Table 4
Method of Self Injury by Gender

	Males	Females	Pearson's Chi-Square
Method	No. within gender (%)	No. within gender (%)	χ^2
Any	83 (53.9%)	105 (49.3%)	0.46
Cut self	21 (13.4%)	64 (30.0%)	14.20**
Burned self	18 (11.5%)	17 (8.0%)	1.28
Carved marks	22 (14.0%)	48 (22.5%)	4.28*
Scratch skin	26 (16.6%)	52 (24.4%)	3.35
Bit self	18 (11.5%)	21 (9.9%)	0.25
Stuck sharp objects	25 (15.9%)	25 (11.7%)	1.36
Broken bones	0 (0%)	1 (0.5%)	0.74
Banged head	11 (7.0%)	22 (10.3%)	1.23
Punched self	19 (12.1%)	20 (9.4%)	0.71
Prevented wounds healing	12 (7.6%)	23 (10.8%)	1.05
Other ¹	4 (2.5%)	10 (4.7%)	1.14

¹= Pinching, pulling hair & removing finger/toe nails.

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

Zero-order correlations among the variables included in the current study are presented separately by gender in Tables 5 and 6. Among females, a lifetime prevalence of self-injury was significantly related to all the variables of interest, with the strongest relationship between self-

injury and emotion dysregulation $r_{pb} = .343, p < .001$. There were also significant correlations between anxious and avoidant attachment, alexithymia and emotion dysregulation, with a strong positive relationship between alexithymia and emotion dysregulation $r = .753, p < .001$. In contrast, for males self-injury was not significantly related to anxious or avoidant attachment, or emotion dysregulation. There was a negligible association between self-injury and alexithymia, $r_{pb} = .164, p = 0.40$. These findings fail to support a clear link between self-injury, as measured on the DSHI, and attachment insecurity, alexithymia and emotion dysregulation in males.

Table 5
Correlations among Study Variables: Females Only

Measures	Self-Injury Group ^a	Anxious Attachment	Avoidant Attachment	Alexithymia
Anxious Attachment	.230**	-	-	-
Avoidant Attachment	.259**	.508**	-	-
Alexithymia	.257**	.525**	.509**	-
Emotion Dysregulation	.343**	.543**	.433**	.753**

^a Point-biserial correlation for self-injury group to the continuous variables

** $p < .001$

Table 6
Correlations among Study Variables: Males Only

Measures	Self-Injury Group ^a	Anxious Attachment	Avoidant Attachment	Alexithymia
Anxious Attachment	.123	-	-	-
Avoidant Attachment	.062	.346**	-	-
Alexithymia	.164*	.310**	.482**	-
Emotion Dysregulation	.141	.512**	.350**	.590**

^a Point-biserial correlation for self-injury group to the continuous variables

* $p < .05$

** $p < .001$

2.3.2 Analysis of Difference

As reported in Table 7, the main effect for self-injury group was significant. Pillai's $V = 0.069, F(4,363) = 6.72, p < .001$. Thus, independent of the effects of gender, there was an overall difference in attachment insecurity, alexithymia and emotion dysregulation between participants who self-injured and those who did not. A closer examination of the univariate effects revealed that self-injurers reported greater levels of attachment anxiety and avoidance, higher scores on the total measure of alexithymia, and more significant difficulties with emotion dysregulation.

The main effect for gender was also significant. Pillai's $V = 0.083, F(4,363) = 8.19$, indicating that there was an overall difference in attachment insecurity, alexithymia and emotion dysregulation for males and females, regardless of self-injury group membership. The univariate effects for gender differences indicated significant differences on two of the four

variables (attachment anxiety and difficulties in emotion regulation). Thus, females reported greater levels of attachment anxiety and more difficulties in regulating their emotions. Males and females reported similar levels of attachment avoidance and alexithymia, independent of self-injury group.

There was a significant interaction between self-injury group membership and gender, although the reported p value was on the edge of significance. Pillai's $V = 0.026$, $F(4,363) = 2.44$, $p = .047$ indicating that the relationship between self-injury and attachment insecurity, alexithymia and emotion dysregulation differs between males and females. The univariate effects indicated significant differences on two of the four variables (attachment avoidance and emotion dysregulation), thus females who reported engaging in self-injury reported higher scores on avoidant attachment and difficulties in emotion regulation than males who reported self-injury. The pattern of difference between self-injurers and non-self-injurers across attachment anxiety and alexithymia was similar for females and males.

Table 7
Means and Standard Deviations for Variables by Gender and Self-Injury Status

Variables	Females (N = 213)				Males (N = 157)			
	No SIB (N = 108)		SIB (N = 105)		No SIB (N = 74)		SIB (N = 83)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Anxious Attachment	3.39	1.18	3.94	1.15	3.19	1.03	3.45	1.10
Avoidant Attachment	2.54	0.96	3.13	1.23	3.10	1.11	2.97	1.00
Alexithymia	44.96	11.56	51.26	12.18	45.81	10.53	49.34	10.72
Emotion Dysregulation	79.99	23.71	97.83	25.43	77.47	19.19	83.00	19.69

Table 8
Multivariate and Univariate Effects of Self-Injury Group and Gender on Attachment, Alexithymia and Emotion Dysregulation

Dependent Variables	V	F	ω^2	P
Self-Injury Status	0.069	6.72		<.001
<i>Anxious Attachment</i>		11.73	0.027	0.01
<i>Avoidant Attachment</i>		9.97	0.023	0.02
<i>Alexithymia</i>		16.84	0.040	<.001
<i>Emotion Dysregulation</i>		24.21	0.055	<.001
Gender	0.083	8.19		<.001
<i>Anxious Attachment</i>		8.12	0.018	0.05
<i>Avoidant Attachment</i>		3.19	0.005	0.75
<i>Alexithymia</i>		0.21	<.000	0.65
<i>Emotion Dysregulation</i>		13.35	0.029	<.001
Self-Injury * Gender	0.026	2.44		0.047
<i>Anxious Attachment</i>		1.45	0.001	0.23
<i>Avoidant Attachment</i>		4.03	0.007	0.045
<i>Alexithymia</i>		1.30	<.000	0.25
<i>Emotion Dysregulation</i>		6.72	0.013	0.01

2.3.3 Emotion Dysregulation and Alexithymia as Independent Mediators of the Relation between Attachment Insecurity and Self-Injury

In order to examine whether attachment insecurity (anxious and avoidant) was linked to self-injury through a single mediator (alexithymia or emotion dysregulation), a succession of simple mediation models were tested using PROCESS (Hayes, 2013). Given the preliminary nature of this research, the theoretical independence of the predictor variables and the shared variance between the hypothesised mediators, these relationships were investigated using a simple mediation model as opposed to multiple predictors or mediators (see Figure 2 for path diagram). The pathway that leads from attachment insecurity to self-injury whilst controlling for the mediator is called the direct effect (path *c*). The indirect effect (path *c'*) represents how self-injury is influenced by attachment insecurity through a causal sequence in which attachment insecurity influences the mediator (path *a*), which in turn influences self-injury (path *b*).

2.3.4 Findings by Gender

There were no significant direct or indirect effects for the proposed simple mediation models in males. As such, for males there was no evidence that attachment insecurity influenced self-injury independently or through its effect on alexithymia or emotion dysregulation.

In contrast, for females, attachment insecurity, both anxious and avoidant, indirectly influenced self-injury through its effect on both alexithymia and emotion dysregulation. All of the proposed simple mediation analyses revealed biased-corrected bootstrap confidence intervals for the indirect effect (path c') that were entirely above zero. The results of the four separate analyses can be seen in Table 9. The largest indirect effect was found for anxious attachment influencing self-injury through its effects on emotion dysregulation. As can be seen in Table 9, females with greater levels of attachment anxiety had more difficulties with regulating their emotions ($a = 11.878$), and females with emotion regulation difficulties would be more likely to engage in self-injury ($b = 0.027$). A bias-corrected bootstrap confidence interval for the indirect effect ($c' = 0.322$) based on 10,000 bootstrap sample was entirely above zero (0.156 to 0.540). In terms of the direct effects, for three of the four analyses, there was no evidence that attachment insecurity influenced self-injury independent of its effects on emotion regulation or alexithymia. However, there was a significant direct effect for attachment avoidance on self-injury when controlling for alexithymia as a mediator.

Table 9

Females: Regression Analyses Examining Alexithymia or Emotion Dysregulation as Mediators of the Relation between Attachment Insecurity and Deliberate Self-Injury

		Path a			Path b			Path c (Direct)			Path c' (Indirect)	95% BC	
		Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	P		LLCI	ULCI
Anxious Attachment	Alexithymia	5.389	0.602	<.001	0.033	0.014	<.05	0.236	0.640	.093	0.178	0.037	0.353
	Emotion Dysregulation	11.878	1.264	<.001	0.027	0.007	<.001	0.120	0.144	.402	0.322	0.156	0.540
Avoidant Attachment	Alexithymia	5.481	0.639	<.001	0.030	0.014	<.05	0.333	0.149	<.05	0.165	0.023	0.351
	Emotion Dysregulation	9.946	1.424	<.001	0.025	0.147	.062	0.275	0.147	.061	0.250	0.110	0.454

Coeff. = Unstandardised model coefficient.

Path a = relation between attachment insecurity and mediator, Path b = relation between mediator and self-injury, Path c = attachment insecurity to self-injury relation (direct effect), Path c' = attachment insecurity to self-injury relation, through the mediator.

2.3.5 Self-Injury and Subscale Analysis in Females

The previous analyses have determined that the total scores on both the Difficulties in Emotion Regulation Scale (DERS) and Toronto Alexithymia Scale (TAS) mediate the relationship between attachment insecurity and self-injury in females. However, it is of interest to unpick this relationship further to explore which of the subscales is of most significance. Such findings are of clinical importance when determining targeted intervention in at risk populations. Given the absence of significant relationships at the level of the total scores within a male population, the findings discussed below are based on the female sample. Zero-order correlations among the study variables in females, including the subscales of the DERS and the TAS, are presented in Table 10. A lifetime prevalence of self-injury was significantly related to

all the variables of interest, excluding the *externally oriented thinking* subscale of the TAS. Of note, there were moderate positive relationships between self-injury and the TAS subscale *difficulties identifying feelings* $r_{pb} = .315, p < .001$ and two subscales of the DERS; *non-acceptance of emotional experiences* $r_{pb} = .324, p < .001$ and *lack of emotional regulation strategies* $r_{pb} = .322, p < .001$.

Table 10
Correlations among Study Variables Subscales: Females

	Self-Injury Group ^c	Anxious	Avoidant	DIF	DDF	EOT	Non Accept.	Goal	Impulse	Awareness	Strategies
Anxious	.230**	-	-	-	-	-	-	-	-	-	-
Avoidant	.259**	.508**	-	-	-	-	-	-	-	-	-
DIF^a	.315**	.543**	.359**	-	-	-	-	-	-	-	-
DDF^a	.236**	.488**	.558**	.698**	-	-	-	-	-	-	-
EOT^a	.005	.169*	.341**	.283**	.441**	-	-	-	-	-	-
Non Accept.^b	.324**	.483**	.429**	.566**	.563**	.129	-	-	-	-	-
Goal^b	.227**	.349**	.211**	.428**	.331**	.122	.440**	-	-	-	-
Impulse^b	.265**	.385**	.228**	.640**	.471**	.274**	.536**	.594**	-	-	-
Awareness^b	.218**	.261**	.425**	.498**	.556**	.542**	.397**	.190**	.377**	-	-
Strategies^b	.322**	.549**	.344**	.661**	.547**	.207**	.689**	.688**	.785**	.343**	-
Clarity^b	.182**	.423**	.395**	.700**	.629**	.353**	.531**	.376**	.614**	.474**	.594**

^a= Subscales of the TAS, ^b= Subscales of the DERS

^c= Point-biserial correlation for self-injury group to the continuous variables

Anxious = ECR Attachment Anxiety Subscale, Avoidant = ECR-R Attachment Avoidance Subscale, DIF = Difficulties identifying feelings, DDF = Difficulties describing feelings, EOT = Externally oriented thinking, Non Accept. = Non-acceptance of emotional experiences, Goal = Difficulties Engaging in Goal Directed Behaviour, Impulse = Impulse Control Difficulties, Awareness = Lack of Emotional Awareness, Strategies = Limited Access to Emotion Regulation Strategies, Clarity = Lack of Emotional Clarity.

** $p < .001$

2.3.6 Subscales and Difference Analysis

As reported in Table 12, there was a significant effect of self-injury group on alexithymia, Pillai's $V = 0.110, F(6,206) = 8.64, p < .001$. A closer examination of the univariate effects revealed that self-injurers scored higher on all of the reported subscales of the TAS aside from *externally oriented thinking*. There was also a significant effect of self-injury group on difficulties in emotion regulation, Pillai's $V = 0.137, F(6,206) = 5.43, p < .001$. The univariate effects indicated significant differences on all of subscales of the DERS. Of note, the largest effect sizes were found for the following subscales: *difficulties identifying feelings*, *non-acceptance of emotional experiences* and *limited access to emotional regulation strategies*.

Table 11

Means and Standard Deviations for Subscales of the TAS and the DERS by Self-Injury Group in Females

Variables	Females (N = 213)			
	No SIB (N = 108)		SIB (N = 105)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Alexithymia</i>				
Difficulties Identifying	14.75	5.69	18.80	6.55
Difficulties Describing	11.94	4.43	14.14	4.69
Externally-Oriented	18.28	3.63	18.31	4.06
<i>Emotion Dysregulation</i>				
Non-acceptance	13.06	5.63	17.23	6.55
Goal	15.22	4.68	17.41	4.76
Impulse	10.79	4.77	13.70	5.81
Awareness	13.69	3.60	15.49	4.48
Strategies	17.08	6.93	22.04	7.72
Clarity	11.33	2.26	12.25	2.70

Table 12

Multivariate and Univariate Effects of Self-Injury Group on the Subscales of the TAS and the DERS in Females

Dependent Variables	<i>V</i>	<i>F</i>	ω^2	<i>P</i>
<i>Alexithymia</i>	0.110	8.64		<.001
Difficulties Identifying		23.25	0.095	<.001
Difficulties Describing		12.47	0.051	<.001
Externally-Oriented		0.071	<.001	.872
<i>Emotion Dysregulation</i>	0.137	5.43		<.001
Non Acceptance		24.79	0.101	.001
Goal		11.42	0.047	<.001
Impulse		15.97	0.066	<.001
Awareness		10.50	0.043	.001
Strategies		24.34	0.099	<.001
Clarity		7.24	0.028	.008

2.3.7 Subscales of the Difficulties in Emotion Regulation Scale as Independent Mediators of the Relation between Attachment Insecurity and Self-Injury

Simple mediation analyses were conducted with the subscales of the DERS serving as mediators. In terms of the direct effects, there was evidence that attachment anxiety influenced self-injury independent of its effects on four of the six DERS subscales. Please see Table 13 for detailed findings. However, there were no significant direct effects when controlling for *non-acceptance of emotional experiences* or *limited access to emotion regulation strategies* as

mediators. Furthermore, findings suggested that attachment avoidance influenced self-injury independent of its effects on all of the DERS subscales. As such, it is clear that, in the majority, attachment style significantly predicts a lifetime prevalence of self-injury when controlling for individual differences in components of emotion regulation.

As can be seen in Table 13, the findings suggested that attachment anxiety indirectly influenced self-injury through its effect on five of the six DERS subscales. Consequently, with attachment anxiety as a predictor and *lack of emotional clarity* as a mediator, the biased-corrected bootstrap confidence interval for the indirect effect (pathway c') was not entirely above zero. In respect to the remaining subscales, significant indirect effects were reported. In a similar pattern, evidence revealed that attachment avoidance indirectly influenced self-injury through its independent effect on four of the six subscales. As such, there was no evidence of a significant indirect effect for the models with attachment avoidance as a predictor and *lack of emotional clarity* or *lack of awareness of emotional experiences* as a mediator.

The largest indirect effect was found for anxious attachment influencing self-injury through its effects on *lack of emotion regulation strategies*. Females with greater levels of attachment anxiety experienced a lack of emotion regulation strategies ($a = 0.373$), and females with an absence of strategies would be more likely to engage in self-injury ($b = 0.027$). A bias-corrected bootstrap confidence interval for the indirect effect ($c' = 0.286$) based on 10,000 bootstrap sample was entirely above zero (0.104 to 0.433).

Table 13

Females: Regression Analyses Examining the Subscales of Emotion Dysregulation as Mediators of the Relation between Attachment Insecurity and Deliberate Self-Injury

Predictor (X)	Mediators (M)	Path <i>a</i>			Path <i>b</i>			Path <i>c</i> (Direct)			Path <i>c'</i> (Indirect)	95% BC	
		Coeff.	SE	<i>p</i>	Coeff.	SE	<i>P</i>	Coeff.	SE	<i>P</i>		LLCI	ULCI
Anxious Attachment	Non Accept.	2.616	0.325	<.001	0.097	0.027	<.001	0.179	0.139	.198	0.253	0.109	0.433
	Goal	1.147	0.261	<.001	0.074	0.032	<.05	0.310	0.129	<.05	0.105	0.023	0.227
	Impulse	1.771	0.293	<.001	0.086	0.031	<.005	0.273	0.131	<.05	0.152	0.045	0.297
	Awareness	0.907	0.231	<.001	0.090	0.037	<.05	0.337	0.127	<.01	0.081	0.019	0.586
	Strategies	3.550	0.373	<.001	0.081	0.024	<.001	0.143	0.144	.319	0.286	0.123	0.492
	Clarity	0.892	0.132	<.001	0.089	0.064	<.163	0.329	0.133	<.05	0.080	-.047	0.203
Avoidant Attachment	Non Accept.	2.429	0.352	<.001	0.091	0.027	<.01	0.293	0.146	<.05	0.222	.097	0.404
	Goal	0.899	0.286	<.005	0.082	0.031	<.01	0.433	0.136	<.005	0.074	0.016	0.173
	Impulse	1.101	0.324	<.005	0.091	0.029	<.005	0.419	0.138	<.005	0.100	0.028	0.238
	Awareness	1.550	0.227	<.001	0.071	0.039	.072	0.388	0.143	<.05	0.110	-.002	0.256
	Strategies	2.338	0.439	<.001	0.077	0.021	<.001	0.338	0.142	<.05	0.180	.078	0.337
	Clarity	0.873	0.140	<.001	0.083	0.063	.185	0.421	0.142	<.005	0.072	-.030	0.214

2.3.8 Subscales of the Toronto Alexithymia Scale as Independent Mediators of the Relation between Attachment Insecurity and Self-Injury

Simple mediation analyses were conducted with the subscales of the TAS serving as mediators. In terms of the direct effects, there was evidence that attachment anxiety influenced self-injury independent of its effects on two of the three TAS subscales (please see Table 14). However, there were no significant direct effects when controlling for *difficulties identifying feelings*. Furthermore, findings suggested that attachment avoidance influenced self-injury independent of its effects on all of the TAS subscales.

As can be seen in Table 14, the findings suggested that attachment anxiety indirectly influenced self-injury through its effect on two of the three TAS subscales. The biased-corrected bootstrap confidence interval for the indirect effect (pathway *c'*) was not entirely above zero for the *externally oriented thinking* subscale. In contrast, evidence revealed that attachment avoidance indirectly influenced self-injury through only one of the subscales; *difficulties identifying feelings*. The largest indirect effect was found for anxious attachment influencing self-injury through its effects on *difficulties identifying feelings*. Females with greater levels of attachment anxiety had more difficulties identifying their feelings ($a = 0.312$), and females who found it harder to recognise their emotions would be more likely to engage in self-injury ($b = 0.091$). A bias-corrected bootstrap confidence interval for the indirect effect ($c' = 0.267$) based on 10,000 bootstrap sample was entirely above zero (0.113 to 0.454).

Table 14

Females: Regression Analyses Examining the Subscales of Alexithymia as Mediators of the Relation between Attachment Insecurity and Deliberate Self-Injury

Predictor (X)	Mediators (M)	Path <i>a</i>			Path <i>b</i>			Path <i>c</i> (Direct)			Path <i>c'</i> (Indirect)	95% BC	
		Coeff.	SE	<i>p</i>	Coeff.	SE	<i>P</i>	Coeff.	SE	<i>P</i>		LLCI	ULCI
Anxious Attachment	DIF	2.930	0.312	<.001	0.091	0.028	<.005	0.155	0.144	.279	0.267	0.113	0.454
	DDF	1.914	0.236	<.001	0.074	0.035	<.05	0.270	0.138	.050	0.142	0.011	0.290
	EOT	0.545	0.218	<.05	-.020	0.038	.596	0.416	0.125	<.005	-.011	-.075	0.026
Avoidant Attachment	DIF	2.035	0.364	<.001	0.088	0.025	<.05	0.337	0.142	<.05	0.179	0.077	0.336
	DDF	2.296	0.235	<.001	0.061	0.037	.098	0.351	0.154	<.05	0.140	-.024	0.334
	EOT	1.150	0.219	<.001	-.054	0.040	.180	0.554	0.144	<.001	-.062	-.172	0.025

2.4 Discussion

Previous studies have shown that difficulties regulating emotions are characteristic of individuals who self-injure (Gratz & Roemer, 2004) and that attachment experiences are important in the development of these emotion regulation capabilities (Shaver & Mikulincer, 2003). Consequently, emotion dysregulation was a conceivable mechanism to explain the relationship between attachment style and self-injury. The results of this study suggest that emotion dysregulation mediates the relationship between attachment insecurity and self-injurious behaviour in females. Specifically, findings suggest that an insecure attachment style impacts on females' ability to understand and regulate emotional experiences. Consequently, attachment style serves as an indirect risk factor for the development of maladaptive emotion regulation strategies such as self-injury. No such relationship was found in males, this suggests that an alternative explanatory model may be necessary to aid our understanding of self-injury status in males.

2.4.1 Prevalence and Characteristics of Deliberate Self-Injury

The prevalence of self-injury in this sample (50.8%) is considerably higher than the percentages of lifetime prevalence cited in previous studies (Meuhlenkamp et al., 2012; Whitlock et al., 2006). There are numerous possible explanations for this anomalous finding. Firstly, as noted by Muehlenkamp et al. (2012), studies utilising behavioural checklists (e.g. DSHI) report significantly higher prevalence estimates than those dependent on single item assessment measures (e.g. Have you ever had thoughts of NSSI (hurting yourself purposefully without wanting to die?)). Consequently, the high prevalence rate may be an artefact of an assessment tool that prompts participants to endorse a range of self-injurious behaviours as

opposed to depending on their interpretation of the meaning of 'NSSI'. Secondly, the nature of participant recruitment meant the sample were entirely self-selecting. Consequently, individuals with a history of self-injury may be more drawn to a study entitled 'Deliberate Self-Harm, Relationships and Emotional Experiences' than those without such experiences. Finally, this unusual finding may be the result of a cohort effect; the majority of the sample was undergraduate students at a University in the South of England, this affiliation may serve as a risk factor for engaging in self-injurious behaviour.

In relation to gender differences and the prevalence of self-injury, the prevailing belief is that females self-injure more than males (Skegg, 2005; Klonsky & Muehlenkamp, 2007). This assertion is reflected in the fact that, prior to the 2000s, the majority of studies examining self-injurious behaviours focused on females (Favazza & Conterio, 1989; Herpertz, 1995). Contrary to these assumptions, but in concordance with recent studies suggesting self-injury may be equally as common in men (Andover et al., 2012), the current study found no significant gender differences in the lifetime prevalence of self-injury. This finding challenges previous assumptions and can arguably be related to the choice of assessment measure. Single item assessment measures are dependent on the social understanding of self-injurious behaviours; for example, self-injury is often identified as a 'female behaviour' where cutting is portrayed as the prototypical form (Whitlock et al., 2011). As an illustration, this study found that females were significantly more likely to rely on cutting and carving marks into their skin as methods of self-injury, which is entirely in accordance with previous literature (Certutti et al., 2011; Law & Shek, 2013). In contrast, evidence suggests that male self-injurers tend to rely on self-punching or burning as a method of deliberate harm to self (Andover et al., 2010). Consequently, the prompt of a behavioural checklist may offer a more accurate picture of the prevalence of self-injury by gender. However, evidence suggested that females in this study employed a wider range of self-injury methods, and were more like to harm themselves on a regular basis; this indicates that their self-injurious behaviour may be of greater severity.

2.4.2 Relationships between Study Variables and Self-Injury by Gender

All of the hypothesised predictors; attachment insecurity, emotion dysregulation and alexithymia, were significantly related to self-injury status in females. However, an identical analysis in the male sample revealed no significant relationships; aside from between alexithymia and self-injury status where the strength of the finding was negligible. These findings suggest there are clear gender differences in the variables important for understanding self-injury and highlights the importance of examining predictor variables for males and females separately. Arguably, differing predictor variables may reflect gender differences in the function of self-injury; Zetterqvist et al. (2013) found that females were significantly more likely to

endorse automatic functions such as ‘to stop bad feelings’ or ‘to relieve feeling numb or empty’. In contrast, males were more likely to choose ‘superficial reasons’ including ‘I was curious’ or ‘because my friend was’ (Kidger et al., 2012) or social functions: ‘to avoid punishment’ or ‘to feel more a part of a group’ (Zetterqvist et al., 2013). Furthermore, researchers proposing an affect regulation function of self-injury, or linking insecure attachment and self-injurious behaviours, are often basing their claims on evidence from female populations or samples where female self-injurers predominate. As a result, there is a desperate need for research examining the function of self-injury in male populations.

2.4.3 Mediation Model

The central aim of this study was to investigate a mediational model in which emotion dysregulation or alexithymia serve as mediators in the relation between attachment style and self-injury. Given the absence of significant relations between the study variables and self-injury in males, the mediation analysis was based solely on a female population. Consequently, the remainder of this discussion will present findings applicable to understanding self-injury status in females only.

Firstly, the results supported hypothesised associations between attachment style and self-injury status. Female self-injurers reported greater levels of attachment insecurity, both anxious and avoidant, when compared to their peers without a history of self-injury. This supports the assertion that an insecure attachment style is associated with reduced psychosocial functioning throughout the life span and suggests that early attachment experiences, which are closely linked to adult attachment style, may be important in the development of maladaptive coping strategies such as self-injury (Gratz, 2002; Stepp et al., 2008). Secondly, and in accordance with the integrative model of Shaver and Mikulincer (2003), attachment insecurity was also positively related to difficulties regulating emotions and the alexithymia construct. This finding highlights the importance of early attachment experiences in the understanding of emotional experiences, and in the development of adaptive emotion regulation strategies. Consistent with Linehan’s (1993) biosocial theory, which highlights the detrimental impact of an invalidating environment, a negative caregiving experience can have negative consequences for both emotional understanding and future reliance on self-injurious behaviour.

Finally, female self-injurers scored higher on measures of both alexithymia and emotion dysregulation, this finding is in accordance with our hypothesis and entirely consistent with previous research (Gratz & Roemer, 2008; Borrill et al., 2009). As such, self-injurers report deficits in their ability to understand and regulate their emotional experiences. More specifically, analysis by subscale suggest that *difficulties identifying feelings, non-acceptance of*

emotional experiences and *limited access to emotion regulation strategies* are of particular importance in understanding reliance on self-injury. Previous research has consistently highlighted a positive association between *limited access to emotion regulation strategies* and self-injury (Gratz & Roemer, 2008; Perez et al., 2012). In explanation, individuals who perceive they have inadequate emotion regulation skills may be more likely to depend on maladaptive strategies such as self-injury, despite the long-term negative consequences. This assertion clearly supports the proposed function of self-injury as an affect regulation strategy (Klonsky, 2007). In contrast, a number of subscales were entirely unrelated to self-injury; for example *lack of emotional clarity* and *externally oriented thinking*. This finding supports the theoretical understanding of emotion regulation as a multidimensional construct (Gratz & Roemer, 2004) and underscores the importance of exploring associations separately by subscale. Similarly, and in relation to the alexithymia construct, evidence has repeatedly highlighted the importance of *difficulties identifying feelings* as predictive of self-injurious behaviour (Lambert & deMan, 2007; Borrill et al., 2009). It could be hypothesised that individuals who struggle to identify and distinguish their emotional experiences, are unlikely to be able to identify an appropriate regulatory strategy given the context. As such, self-injury may offer a viable solution for the management of confusing feelings.

With respect to the mediation analysis, there are interesting patterns to acknowledge with respect to the direct relationship between attachment insecurity and self-injury status (path *c*). When controlling for the majority of subscales, both within the emotion dysregulation and alexithymia constructs, there was evidence of a direct relation of attachment insecurity on self-injury. As such, independent of the effects of the mediating variables, there is evidence of an association between the predictor and the outcome variables. However, when the total scores or subscales most strongly associated with self-injury were included as mediators, there was limited evidence of a direct relationship, despite evidence of an indirect effect. This suggests that, in these cases, the mediator of interest entirely accounts for the influence of attachment insecurity on self-injury. Historically, similar findings would have prohibited mediation analysis and the attempt to explain the underlying effect of attachment on self-injury (Hayes, 2013). However, modern methodology no longer imposes evidence of a simple association between the predictor and the outcome variable as a precondition for mediation analysis. Consequently, and in accordance with the hypothesis of Marchetto (2006), it appears that any potential relationship between attachment style and self-injurious behaviour is likely to be indirect and complicated by mediating factors.

Both emotion dysregulations and alexithymia were found to significantly mediate the relationship between insecure attachment, both anxious and avoidant, and engagement in self-

injury among a community sample of female adults. This finding reflects and extends the work of Kimball and Diddams (2007) who found that emotion regulation mediates the relationship between attachment and deliberate self-injury. As such, when a caregiver is unable to respond to their child's emotional needs, the child develop an anxious or avoidant attachment style which is likely to remain with them into adulthood. This insecure attachment style, in turn, prohibits the development of constructive emotion regulation skills necessary to cope adaptively with negative arousal. Consequently, these young women who struggle to identify, accept and successfully regulate their emotional experiences are more likely to depend on self-injury as an emotion regulation strategy. This analysis is entirely consistent with the conceptualisation of self-injury as an emotion regulation strategy (Klonsky, 2007) and with the biosocial theory in understanding the development of self-injurious behaviour (Linehan, 1993).

2.4.4 Clinical Implications

In a clinical setting identifying what differentiates self-injuring individuals, and deliberate self-injury related vulnerabilities, is important in targeting and developing successful interventions. The findings from this study have implications across all levels of clinical practice. Firstly, preventative interventions will need to be conscious of the evident gender differences in the risk factors associated with self-injury. Recognising that, in females, deliberate self-injury is primarily an attempt to regulate emotional experiences. Preventative interventions could target the development of emotional education; teaching young people at an early stage how to identify, understand and regulate their emotions before self-injury serves as an alternative emotion-regulation strategy. There is much to be taken from Linehan's Dialectical Behavioural Therapy (1993) in this regard. However, although evidence suggests such an approach may have benefits within a female population, the same cannot be said for males. At this stage, given our limited understanding of the function of self-injury in males, it is difficult to comment on how preventative intervention could be utilised within this population.

Secondly, and with regards to assessment of self-injury, clinicians should take time to explore early attachment experiences and the components of emotion regulation, particularly in females. Such information may be helpful in formulating the development of maladaptive emotion regulation strategies and in validating the understandable intention behind the self-injury. As such, it can be helpful to frame self-injury as indicative of a skill deficit. Specifically, when developing strategies to support females dependent on self-injury, our findings suggest that a focus on identifying and accepting emotion experiences, and having a range of strategies available to manage those experiences, may be important components of a successful intervention. Once again, many of the principles from Dialectical Behavioural Therapy, including mindfulness, may be usefully applied. Finally, given our recognition of the

importance of early attachment experiences and attachment style, clinicians should be mindful of the importance of the therapeutic alliance as a means of modelling a secure attachment style. Relationships characterised by sensitive, responsive care and healthy dependence are likely to offer a safe environment where self-injury, emotional experiences and alternative emotion-regulation strategies can be successfully explored.

2.4.5 Limitations and Future Directions

There are a number of methodological limitations of the current study that should be noted. Firstly, our sample was comprised predominantly of psychology undergraduate students and, although efforts were made to seek participants with a diverse range of demographic characteristics using social media, the conclusions may have limited applicability to alternative demographics. Future researchers may wish to focus their recruitment within settings characterised by lower socio-economic background and a higher proportion of ethnic minorities. Furthermore, the study used a non-clinical and self-selecting sample, consequently the findings may not generalise to individuals commonly accepted to mental health services with self-injurious behaviour.

The study is also limited by the cross-sectional design; as such we are unable to draw conclusions about the direction of relations. Based on theoretical knowledge, we have explored the causal sequence of attachment style, emotion dysregulation and self-injury status. However, it could be hypothesised that rather than attachment influencing emotion regulation difficulties, the presence of emotion dysregulation contributes to challenging interpersonal relationships, which in turn serves as a risk factor for self-injury. Longitudinal modelling is required to fully appreciate the directionality of relations.

In addition, we failed to control for hypothetically important confounding variables such as intensity of emotional experiences. Emotional intensity may account for shared variance across measures; for example, individuals who experience emotions more intensely are more likely to have difficulties in managing relationships, in regulating their emotions and, as a result, are at greater risk of self-injury. A measure of emotional intensity would have been a helpful addition to the study design. Furthermore, our conclusions are based entirely of retrospective self-report measures which, although commonly used as a means of assessing highly personal behaviours and experiences, are limited by the absence of external verification and recall bias. Observational or behavioural measures of attachment style and emotion regulation may have strengthened the study conclusions.

There is a striking absence in the literature about self-injurious behaviours in males. Researchers interested in understanding self-injury in its entirety should be careful not to apply

conclusions drawn from predominantly female samples across both genders. As such, future research could usefully aim to explore the function of self-injury in males and to recruit more gender balanced samples to allow for separate analysis by gender. Finally, given the aims of this study of presenting an integrated, theoretically based model of risk factors to understand self-injury by gender, we have chosen not to explore additional questions of the data. Future research may wish to explore how the model may differ dependent on method of self-injury or frequency of self-injurious behaviour.

2.5 Conclusion

In conclusion, the results of this study suggest that 50.8% of adults who volunteered to complete an online questionnaire have a history of self-injurious behaviour. This significant figure highlights the importance of developing a comprehensive understanding of the origins and functions of self-injury. Arguably, this study offers an important first step in this regard, and particularly in relation to associated gender differences. Results suggested that emotion dysregulation and alexithymia mediate the relationship between attachment insecurity and self-injury in females. Specifically, limited access to emotion regulation strategies and difficulty identifying feelings were particularly important subscales in interpreting this finding. This has important implications for the development of effective preventative and treatment approaches for self-injury in females. In contrast, no such relationship was demonstrated in males despite the absence of gender differences in the prevalence of self-injury. This suggests the need for future research efforts directed in understanding the origins and function of self-injury in males.

Appendices

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Appendix A

Psychobook Advert

Exploring gender differences: The importance of attachment in the development of emotion regulation skills and deliberate self-harm.

We are interested in what factors increase the risk of an individual engaging in deliberate self-harm, and whether there are differences between males and females. The study consists of a number of questions about deliberate self-harm, relationships and emotions. On average it will take 20 minutes to complete through iSurvey and you will receive 2 research credits in return for your participation. If you choose to enter the prize draw for an opportunity to win £50 of Amazon vouchers, you will not be eligible to receive research credits.

Start Date: 1st July 2013

End Date: 31st December 2013

Appendix B

Participant Information Sheet

[02.09.2013] [Version 2.0]

Study Title: Exploring gender differences: The importance of attachment in the development of emotion regulation skills and deliberate self-harm.

Researcher: Chloe de Haast

Ethics number: 6218

Please read this information carefully before deciding whether to take part in this research. You will need to indicate that you have understood this information before you can continue. You must also be aged over 18 to participate. By ticking the box at the bottom of this page and clicking 'Continue', you are consenting to participate in this survey.

What is the research about?

My name is Chloe de Haast, a Trainee Clinical Psychologist from the University of X, and this study forms part of my qualification to become a Clinical Psychologist. In this study we are interested in what factors increase an individual's risk of engaging in deliberate self-harm, and whether there are differences between males and females. We hope that this knowledge will be used to support young people at risk of deliberate self-harm.

Why have I been chosen?

There is no particular reason why you have been approached to take part in this study. We are interested in responses from a wide range of participants.

What will happen to me if I take part?

You will be asked to complete an online survey which will take approximately 20 minutes.

Are there any risks involved?

This study includes personal questions about deliberate self-harm, your emotions and relationships with others. There will be information provided at the end of the study about sources of further support; however you are advised not to take part if you find this subject matter distressing. If you would like to know more about support in managing deliberate self-harm please see www.nshn.co.uk, National Self-Harm Network: the lead UK charity offering support, advice and advocacy services to people affected by self-harm directly or in a care role.

Will my participation be confidential?

All information provided will be stored securely and anonymously in accordance with the Data Protection Act. If you choose to enter the prize draw as opposed to receiving research credits, you will be asked to provide a contact email at the end of the questionnaire. This information will not be linked to questionnaire responses and will be stored on a separate database. Once data collection is complete and the winner announced, all contact information will be deleted.

What happens if I change my mind?

Your participation is voluntary and you may withdraw your participation at any time by exiting the webpage without your legal rights being affected.

What happens if something goes wrong?

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk or have any other concerns or complaints, you may contact the Chair of the Ethics Committee, Psychology, University of X. Phone: +44 (0)23 8059 XXXX, email slb1n10@X.ac.uk

Where can I get more information?

If you have any further questions or desire a summary of the findings of this research project please contact Chloe de Haast on cdh1e11@X.ac.uk.

Statement of Consent

I have read and understood the information about this study. In consenting, I understand that my legal rights are not affected. I also understand that data collected as part of this research will be anonymous and that published results will maintain so.

I certify that I am 18 years or older. I have read the above consent form and I give consent to participate in the above described research.

Please tick (check) the box below to indicate that you consent to taking part in this survey.

Appendix C

C.1 Deliberate Self-Harm Inventory (Gratz, 2001)

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

Please answer yes to a question only if you did the behaviour intentionally, or on purpose, to hurt yourself. Do not respond yes if you did something accidentally (e.g. you tripped and banged your head by accident). Also, please be assured that your responses are completely confidential.

1. Have you ever intentionally (i.e., on purpose) cut your wrist, arms, or other area(s) of your body (without intending to kill yourself)? (circle one):

1. Yes 2. No

If yes, how many times have you done this?

In the questionnaire given to participants, the above format is used for each of the following items, with each index question followed by the follow-up question. Like Item 1, each of the following items begins with the phrase: Have you ever intentionally (i.e., on purpose)

2. Burned yourself with a cigarette, lighter or a match?

3. Carved marks into your skin?

4. Severely scratched yourself, to the extent that scarring or bleeding occurred?

5. Bit yourself, to the extent that you broke the skin?

6. Stuck sharp objects such as needles, pins, staples, etc. into your skin, not including tattoos, ear piercing, needles used for drug use, or body piercing?

7. Broken your own bones?

8. Banged your head against something, to the extent that you caused a bruise to appear?

9. Punched yourself, to the extent that you caused a bruise to appear?

10. Prevented wounds from healing?

11. Done anything else to hurt yourself that was not asked about in this questionnaire? If yes, what did you do to hurt yourself?

C.2 The Experiences in Close Relationships-Revised (Fraley, Waller & Brennan, 2000)

Generic Instructions: The statements below concern how you feel in emotionally intimate relationships. We are interested in how you *generally* experience relationships, not just in what is happening in a current relationship. Respond to each statement by selecting a number to indicate how much you agree or disagree with the statement.

1. I'm afraid that I will lose my partner's love.
1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neither Agree nor Disagree, 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree
2. I often worry that my partner will not want to stay with me.
As above etc.
3. I often worry that my partner doesn't really love me.
4. I worry that romantic partners won't care about me as much as I care about them.
5. I often wish that my partner's feelings for me were as strong as my feelings for him or her.
6. I worry a lot about my relationships.
7. When my partner is out of sight, I worry that he or she might become interested in someone else.
8. When I show my feelings for romantic partners, I'm afraid they will not feel the same about me.
9. I rarely worry about my partner leaving me.
10. My romantic partner makes me doubt myself.
11. I do not often worry about being abandoned.
12. I find that my partner(s) don't want to get as close as I would like.
13. Sometimes romantic partners change their feelings about me for no apparent reason.
14. My desire to be very close sometimes scares people away.
15. I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am.
16. It makes me mad that I don't get the affection and support I need from my partner.
17. I worry that I won't measure up to other people.
18. My partner only seems to notice me when I'm angry.
19. I prefer not to show a partner how I feel deep down.
20. I feel comfortable sharing my private thoughts and feelings with my partner.
21. I find it difficult to allow myself to depend on romantic partners.
22. I am very comfortable being close to romantic partners.
23. I don't feel comfortable opening up to romantic partners.
24. I prefer not to be too close to romantic partners.
25. I get uncomfortable when a romantic partner wants to be very close.
26. I find it relatively easy to get close to my partner.
27. It is not difficult for me to get close to my partner.
28. I usually discuss my problems and concerns with my partner.
29. It helps to turn to my romantic partner in times of need.
30. I tell my partner just about everything.
31. I talk things over with my partner.
32. I am nervous when partners get too close to me.
33. I feel comfortable depending on romantic partners.
34. I find it easy to depend on romantic partners.
35. It is easy for me to be affectionate with my partner.
36. My partner really understands me and my needs.

C.3 Toronto Alexithymia Scale (Parker, Taylor & Bagby, 2003)

Using the scale provided as a guide, indicate how much you agree or disagree with each of the following statements by circling the corresponding number. Give only one answer for each statement.

Circle 1 if you STRONGLY DISAGREE

Circle 2 if you MODERATELY DISAGREE

Circle 3 if you NEITHER DISAGREE NOR AGREE

Circle 4 if you MODERATELY AGREE

Circle 5 if you STRONGLY AGREE

- | | |
|---|-----------|
| 1. I am often confused about what emotion I am feeling. | 1 2 3 4 5 |
| 2. It is difficult for me to find the right words for my feelings. | 1 2 3 4 5 |
| 3. I have physical sensations that even doctors don't understand. | 1 2 3 4 5 |
| 4. I am able to describe my feelings easily. | 1 2 3 4 5 |
| 5. I prefer to analyze problems rather than just describe them. | 1 2 3 4 5 |
| 6. When I am upset, I don't know if I am sad, frightened, or angry. | 1 2 3 4 5 |
| 7. I am often puzzled by sensations in my body. | 1 2 3 4 5 |
| 8. I prefer to just let things happen rather than to understand why they turned out that way. | 1 2 3 4 5 |
| 9. I have feelings that I can't quite identify. | 1 2 3 4 5 |
| 10. Being in touch with emotions is essential. | 1 2 3 4 5 |
| 11. I find it hard to describe how I feel about people. | 1 2 3 4 5 |
| 12. People tell me to describe my feelings more. | 1 2 3 4 5 |
| 13. I don't know what's going on inside me. | 1 2 3 4 5 |
| 14. I often don't know why I am angry. | 1 2 3 4 5 |
| 15. I prefer talking to people about their daily activities rather than their feelings. | 1 2 3 4 5 |
| 16. I prefer to watch "light" entertainment shows rather than psychological dramas. | 1 2 3 4 5 |
| 17. It is difficult for me to reveal my innermost feelings, even to close friends. | 1 2 3 4 5 |
| 18. I can feel close to someone, even in moments of silence. | 1 2 3 4 5 |
| 19. I find examination of my feelings useful in solving personal problems. | 1 2 3 4 5 |
| 20. Looking for hidden meanings in movies or plays distracts from their enjoyment. | 1 2 3 4 5 |

C.4 Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004)

Please indicate how often the following 36 statements apply to you by selecting the appropriate number from the scale below alongside each item.

5-point scale:

1=almost never, 2=sometimes, 3=about half the time, 4=most of the time, 5=almost always

1. I am clear about my feelings.
2. I pay attention to how I feel.
3. I experience my emotions as overwhelming and out of control.
4. I have no idea how I am feeling.
5. I have difficulty making sense out of my feelings.
6. I am attentive to my feelings.
7. I know exactly how I am feeling.
8. I care about what I am feeling.
9. I am confused about how I feel.
10. When I'm upset, I acknowledge my emotions.
11. When I'm upset, I become angry with myself for feeling that way.
12. When I'm upset, I become embarrassed for feeling that way.
13. When I'm upset, I have difficulty getting work done.
14. When I'm upset, I become out of control.
15. When I'm upset, I believe that I will remain that way for a long time.
16. When I'm upset, I believe that I'll end up feeling very depressed.
17. When I'm upset, I believe that my feelings are valid and important.
18. When I'm upset, I have difficulty focusing on other things.
19. When I'm upset, I feel out of control.
20. When I'm upset, I can still get things done.
21. When I'm upset, I feel ashamed with myself for feeling that way.
22. When I'm upset, I know that I can find a way to eventually feel better.
23. When I'm upset, I feel like I am weak.
24. When I'm upset, I feel like I can remain in control of my behaviors.
25. When I'm upset, I feel guilty for feeling that way.
26. When I'm upset, I have difficulty concentrating.
27. When I'm upset, I have difficulty controlling my behaviors.
28. When I'm upset, I believe there is nothing I can do to make myself feel better.
29. When I'm upset, I become irritated with myself for feeling that way.
30. When I'm upset, I start to feel very bad about myself.
31. When I'm upset, I believe that wallowing in it is all I can do.
32. When I'm upset, I lose control over my behaviors.
33. When I'm upset, I have difficulty thinking about anything else.
34. When I'm upset, I take time to figure out what I'm really feeling.
35. When I'm upset, it takes me a long time to feel better.
36. When I'm upset, my emotions feel overwhelming.

Appendix D

Debriefing Statement

The aim of this research was to improve our understanding of the risk factors associated with deliberate self-harm (DSH), and the mechanisms by which they may operate. It is expected that difficulties with regulating emotions and in relationships with other people will be associated with a history of DSH. Your data will help to improve interventions to reduce the damaging effects of DSH. Once again results of this study will not include your name or any other identifying characteristics. The research did not involve any deceptions and if you wish to access a summary of the research findings or have any further questions please contact me at cdh1e11@X.ac.uk.

We have tried to ensure that the questions in this study do not cause any distress. However, it is not uncommon to experience some distress completing questionnaires about deliberate self-harm, emotions and relationships, and support is available. If participating in this study raises any issues for you, we recommend that you contact one of the following resources:

First Support team: dedicated to being the first point of contact and supporting students during times of crisis. The First Support team is based primarily at the Student Services Building (Building 37) on X. We can be contacted by telephone or by email during office hours at:

Tel: +44 (0) 23 8059 XXXX (27488 internal)

Email: firstsupport@X.ac.uk

For more information: www.X.ac.uk/edusupport/firstsupport/

University Counselling service: Individual counselling is offered to clients who decide to choose this form of help. No concern or issue is too big or small to bring to counselling and if an alternative form of help seems more appropriate this can be discussed with a counsellor.

Tel: +44 (0)23 8059 XXXX (internal 23719)

Email: counser@X.ac.uk

For more information: <http://www.X.ac.uk/edusupport/counselling/>

National Self-Harm Network: the lead UK charity offering support, advice and advocacy services to people affected by self-harm directly or in a care role

Support helpline: 0800 622 6000 (7pm-11pm Thursday-Saturday, 6.10pm-10.30pm Sunday)

Email: support@nshn.co.uk

For more information: www.nshn.co.uk

Mind: for better mental health.

InfoLine: 0300 123 3393

For more information: www.mind.org.uk

Thank you for your participation in this research.

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Psychology, University of Southampton, X,. Phone: +44 (0)23 8059 XXXX, email slb1n10@X.ac.uk

List of References

- Adrian, M., Zeman, J., Erdley, C., Lisa, L., & Sim, L. (2011). Emotional dysregulation and interpersonal difficulties as risk factors for nonsuicidal self-injury in adolescent girls. *Journal of Abnormal Child Psychology*, 39(3), 389-400. doi: 10.1007/s10802-010-9465-3
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: Assessed in the strange situation and at home*. Hillsdale, NJ: Erlbaum.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-V*. American Psychiatric Publishing, Inc.
- Andover, M. S., Morris, B. W., Wren, A., & Bruzzese, M. E. (2012). The co-occurrence of non-suicidal self-injury and attempted suicide among adolescents: Distinguishing risk factors and psychosocial correlates. *Child and Adolescent Psychiatry and Mental Health*, 6. doi: 10.1186/1753-2000-6-11
- Andover, M. S., Primack, J. M., Gibb, B. E., & Pepper, C. M. (2010). An examination of non-suicidal self-injury in men: Do men differ from women in basic NSSI characteristics? *Archives of Suicide Research*, 14(1), 79-88. doi: 10.1080/13811110903479086
- Arney, M. F., Crowther, J. H., & Miller, I. W. (2011). Changes in Ecological Momentary Assessment reported affect associated with episodes of nonsuicidal self-injury. *Behavior Therapy*, 42(4), 579-588. doi: 10.1016/j.beth.2011.01.002
- Baetens, I., Claes, L., Muehlenkamp, J., Grietens, H., & Onghena, P. (2011). Non-suicidal and suicidal self-injurious behavior among Flemish adolescents: A web-survey. *Archives of Suicide Research*, 15(1), 56-67. doi: 10.1080/13811118.2011.540467
- Bakken, N. W., & Gunter, W. D. (2012). Self-cutting and suicidal ideation among adolescents: Gender differences in the causes and correlates of self-injury. *Deviant Behavior*, 33(5), 339-356. doi: 10.1080/01639625.2011.584054
- Bagby, R. M., Taylor, G. J., & Parker, J. D. (1994). The twenty-item Toronto Alexithymia Scale—II. Convergent, discriminant, and concurrent validity. *Journal of psychosomatic research*, 38(1), 33-40.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, 51(6), 1173.

- Barrocas, A. L., Hankin, B. L., Young, J. F., & Abela, J. R. (2012). Rates of nonsuicidal self-injury in youth: age, sex, and behavioral methods in a community sample. *Pediatrics*, 130(1), 39-45. doi: 10.1542/peds.2011-2094
- Bjärehed, J., & Lundh, L.-G. (2008). Deliberate self-harm in 14-year-old adolescents: How frequent is it, and how is it associated with psychopathology, relationship variables, and styles of emotional regulation. *Cognitive Behaviour Therapy*, 37(1), 26-37. doi: 10.1080/16506070701778951
- Bjarnason, T., & Thorlindsson, T. (1994). Manifest predictors of past suicide attempts in a population of Icelandic adolescents. *Suicide and Life-Threatening Behavior*, 24(4), 350-358.
- Borges, G., Azrael, D., Almeida, J., Johnson, R. M., Molnar, B. E., Hemenway, D., & Miller, M. (2011). Immigration, suicidal ideation and deliberate self-injury in the Boston youth survey 2006. *Suicide & Life-Threatening Behavior*, 41(2), 193-202. doi: 10.1111/j.1943-278X.2010.00016.x
- Borrill, J., Fox, P., Flynn, M., & Roger, D. (2009). Students who self-harm: Coping style, rumination and alexithymia. *Counselling Psychology Quarterly*, 22(4), 361-372. doi: 10.1080/09515070903334607
- Bowen, A. C. L., & John, A. M. H. (2001). Gender differences in presentation and conceptualization of adolescent self-injurious behaviour: Implications for therapeutic practice. *Counselling Psychology Quarterly*, 14(4), 357-379. doi: 10.1080/09515070110100956
- Bowlby, J. (1973). *Attachment and Loss. Vol. 2: Separation: Anxiety And Anger*. New York: Basic Books.
- Bowlby, J. (1982/1969). *Attachment and loss: Vol. 1. Attachment* (2nd ed.). New York: Basic Books.
- Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment. *Attachment theory and close relationships*, 46-76.
- Brenning, K. M., & Braet, C. (2013). The emotion regulation model of attachment: An emotion-specific approach. *Personal Relationships*, 20(1), 107-123. doi: 10.1111/j.1475-6811.2012.01399.x
- Briere, J., & Gil, E. (1998). Self-mutilation in clinical and general population samples: Prevalence, correlates, and functions. *American Journal of Orthopsychiatry*, 68(4), 609-620.

Buckholdt, K. E., Parra, G. R., & Jobe-Shields, L. (2009). Emotion regulation as a mediator of the relation between emotion socialization and deliberate self-harm. *American Journal of Orthopsychiatry*, 79(4), 482-490. doi: 10.1037/a0016735

Cerutti, R., Manca, M., Presaghi, F., & Gratz, K. L. (2011). Prevalence and clinical correlates of deliberate self-harm among a community sample of Italian adolescents. *Journal of Adolescence*, 34(2), 337-347. doi: 10.1016/j.adolescence.2010.04.004

Chapman, A. L., Gratz, K. L., & Brown, M. Z. (2006). Solving the puzzle of deliberate self-harm: The experiential avoidance model. *Behaviour research and therapy*, 44(3), 371-394.

Cheung, Y. T., Wong, P. W., Lee, A. M., Lam, T. H., Fan, Y. S., & Yip, P. S. (2013). Non-suicidal self-injury and suicidal behavior: prevalence, co-occurrence, and correlates of suicide among adolescents in Hong Kong. *Social Psychiatry & Psychiatric Epidemiology*, 48(7), 1133-1144. doi:10.1007/s00127-012-0640-4

Claes, L., Houben, A., Vandereycken, W., Bijttebier, P., & Muehlenkamp, J. (2010). Brief report: The association between non-suicidal self-injury, self-concept and acquaintance with self-injurious peers in a sample of adolescents. *Journal of Adolescence*, 33(5), 775-778. doi: 10.1016/j.adolescence.2009.10.012

Conradi, H. J., Gerlsma, C., van Duijn, M., & de Jonge, P. (2006). Internal and external validity of the experiences in close relationships questionnaire in an American and two Dutch samples. *The European journal of psychiatry*, 20(4), 258-269.

De Leo, D. (2011). DSM-V and the future of suicidology. *Crisis*, 32(5), 233-239.

Del Giudice, M. (2011). Sex differences in romantic attachment: A meta-analysis. *Personality and Social Psychology Bulletin*, 37(2), 193-214.

Douglas, J., Cooper, J., Amos, T., Webb, R., Guthrie, E., & Appleby, L. (2004). 'Near-fatal' deliberate self-harm: Characteristics, prevention and implications for the prevention of suicide. *Journal of Affective Disorders*, 79(1-3), 263-268. doi: 10.1016/S0165-0327(02)00391-9

Epstein, S., & Meier, P. (1989). Constructive thinking: A broad coping variable with specific components. *Journal of personality and social psychology*, 57(2), 332.

Evans, E., Hawton, K., Rodham, K., Psychol, C., & Deeks, J. (2005). The Prevalence of Suicidal Phenomena in Adolescents: A Systematic Review of Population-Based Studies. *Suicide and Life-Threatening Behavior*, 35(3), 239-250.

- Favazza, A. R., & Conterio, K. (1989). Female habitual self-mutilators. *Acta Psychiatrica Scandinavica*, 79(3), 283-289.
- Fliege, H., Lee, J.-R., Grimm, A., & Klapp, B. F. (2009). Risk factors and correlates of deliberate self-harm behavior: A systematic review. *Journal of Psychosomatic Research*, 66(6), 477-493. doi: 10.1016/j.jpsychores.2008.10.013
- Fonagy, P. (2001). *Attachment theory and psychoanalysis*. Other Press.
- Fraley, R. C., & Shaver, P. R. (1997). Adult attachment and the suppression of unwanted thoughts. *Journal of personality and social psychology*, 73(5), 1080-1091. doi: 10.1037/0022-3514.73.5.1080
- Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item-response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, 78, 350-365.
- Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological science*, 18(3), 233-239.
- Fukunishi, I., Sei, H., Morita, Y., & Rahe, R. H. (1999). Sympathetic activity in alexithymics with mother's low care. *Journal of Psychosomatic Research*, 46(6), 579-589.
- Garisch, J. A., & Wilson, M. S. (2010). Vulnerabilities to deliberate self-harm among adolescents: The role of alexithymia and victimization. *British Journal of Clinical Psychology*, 49(2), 151-162. doi: 10.1348/014466509X441709
- Giletta, M., Scholte, R. H., Engels, R. C., Ciairano, S., & Prinstein, M. J. (2012). Adolescent non-suicidal self-injury: a cross-national study of community samples from Italy, the Netherlands and the United States. *Psychiatry Research*, 197(1-2), 66-72. doi: 10.1016/j.psychres.2012.02.009
- Gratz, K. L. (2003). Risk factors for and functions of deliberate self-harm: An empirical and conceptual review. *Clinical Psychology: Science and Practice*, 10(2), 192-205. doi: 10.1093/clipsy/bpg022
- Gratz, K. L. (2009). *Deliberate Self-Harm Inventory – Youth Version*. Unpublished Measure. University of Mississippi Medical Center, Jackson, MS.

Gratz, K. L., Conrad, S. D., & Roemer, L. (2002). Risk factors for deliberate self-harm among college students. *American Journal of Orthopsychiatry*, 72(1), 128-140. doi: 10.1037/0002-9432.72.1.128

Gratz, K. L., Latzman, R. D., Young, J., Heiden, L. J., Damon, J., Hight, T., & Tull, M. T. (2012). Deliberate self-harm among underserved adolescents: The moderating roles of gender, race, and school-level and association with borderline personality features. *Personality Disorders: Theory, Research, and Treatment*, 3(1), 39-54. doi: 10.1037/a0022107

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, 26(1), 41-54.

Gratz, K. L., & Roemer, L. (2008). The Relationship Between Emotion Dysregulation and Deliberate Self-Harm Among Female Undergraduate Students at an Urban Commuter University. *Cognitive Behaviour Therapy*, 37(1), 14-25.

Gormley, B., & McNiel, D. E. (2010). Adult attachment orientations, depressive symptoms, anger, and self-directed aggression by psychiatric patients. *Cognitive Therapy and Research*, 34(3), 272-281. doi: 10.1007/s10608-009-9267-5

Hamza, C. A., Stewart, S. L., & Willoughby, T. (2012). Examining the link between nonsuicidal self-injury and suicidal behavior: A review of the literature and an integrated model. *Clinical Psychology Review*, 32(6), 482-495.

Hargus, E., Hawton, K., & Rodham, K. (2009). Distinguishing between subgroups of adolescents who self-harm. *Suicide & Life-Threatening Behavior*, 39(5), 518-537. doi: 10.1521/suli.2009.39.5.518

Hawton, K. (2011, September). *Suicidal behaviour in adolescents and youth: Developmental, cross-cultural and prevention perspectives*. Plenary speech at the 26th World Congress of the International Association of Suicide Prevention, Beijing.

Hawton, K., & Harriss, L. (2008). The changing gender ratio in occurrence of deliberate self-harm across the lifecycle. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, 29(1), 4.

Hawton, K., Saunders, K. E., & O'Connor, R. C. (2012). Self-harm and suicide in adolescents. *Lancet*, 379(9834), 2373-2382. doi: 10.1016/S0140-6736(12)60322-5

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: a regression-based approach. New York: Guilford Press.

Herpertz, S. (1995). Self-injurious behaviour Psychopathological and nosological characteristics in subtypes of self-injurers. *Acta Psychiatrica Scandinavica*, 91(1), 57-68.

Hilt, L. M., Nock, M. K., Lloyd-Richardson, E. E., & Prinstein, M. J. (2008). Longitudinal study of nonsuicidal self-injury among young adolescents: Rates, correlates, and preliminary test of an interpersonal model. *The Journal of Early Adolescence*, 28(3), 455-469. doi: 10.1177/0272431608316604

Jacobson, C. M., & Gould, M. (2007). The epidemiology and phenomenology of non-suicidal self-injurious behavior among adolescents: a critical review of the literature. *Archives of Suicide Research*, 11(2), 129-147.

Jarvi, S., Jackson, B., Swenson, L., & Crawford, H. (2013). The impact of social contagion on non-suicidal self-injury: A review of the literature. *Archives of Suicide Research*, 17(1), 1-19. doi: 10.1080/13811118.2013.748404

Kidger, J., Heron, J., Lewis, G., Evans, J., & Gunnell, D. (2012). Adolescent self-harm and suicidal thoughts in the ALSPAC cohort: A self-report survey in England. *BMC Psychiatry*, 12. doi: 10.1186/1471-244X-12-69

Kirchner, T., Ferrer, L., Forns, M., & Zanini, D. (2011). Self-harm behavior and suicidal ideation among high school students. Gender differences and relationship with coping strategies. *Actas Españolas de Psiquiatría*, 39(4), 226-235.

Kimball, J. S., & Diddams, M. (2007). Affect regulation as a mediator of attachment and deliberate self-harm. *Journal of College Counseling*, 10(1), 44-53. doi: 10.1002/j.2161-1882.2007.tb00005.x

Klonsky, E. D., & Muehlenkamp, J. J. (2007). Self-injury: a research review for the practitioner. *Journal of Clinical Psychology*, 63(11), 1045-1056.

Kullik, A., & Petermann, F. (2013). Attachment to parents and peers as a risk factor for adolescent depressive disorders: The mediating role of emotion regulation. *Child Psychiatry and Human Development*, 44(4), 537-548. doi: 10.1007/s10578-012-0347-5

Kvernmo, S., & Rosenvinge, J. H. (2009). Self-mutilation and suicidal behaviour in Sami and Norwegian adolescents: prevalence and correlates. *International Journal of Circumpolar Health*, 68(3), 235-248.

Lambert, A., & de Man, A. F. (2007). Alexithymia, depression, and self-mutilation in adolescent girls. *North American Journal of Psychology*, 9(3), 555-566.

Landstedt, E., & Gådin, K. G. (2011). Deliberate self-harm and associated factors in 17-year-old Swedish students. *Scandinavian Journal of Public Health*, 39(1), 17-25. doi: 10.1177/1403494810382941

Law, B. M. F., & Shek, D. T. L. (2013). Self-harm and suicide attempts among young chinese adolescents in Hong Kong: Prevalence, correlates, and changes. *Journal of Pediatric and Adolescent Gynecology*, 26(3 SUPPL), S26-S32. doi: 10.1016/j.jpag.2013.03.012

Laye-Gindhu, A., & Schonert-Reichl, K. A. (2005). Nonsuicidal self-harm among community adolescents: Understanding the 'Whats' and 'Whys' of Self-Harm. *Journal of Youth and Adolescence*, 34(5), 447-457. doi: 10.1007/s10964-005-7262-z

Levant, R. F., Hall, R. J., Williams, C. M., & Hasan, N. T. (2009). Gender differences in alexithymia. *Psychology of Men & Masculinity*, 10(3), 190-203. doi: 10.1037/a0015652

Linehan, M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. Guilford Press.

Lloyd, E. E., Kelley, M. L., & Hope, T. (1997, April). Self-mutilation in a community sample of adolescents: Descriptive characteristics and provisional prevalence rates. In *annual meeting of the Society for Behavioral Medicine, New Orleans, LA*.

Lundh, L. G., Karim, J., & Quilisch, E. (2007). Deliberate self-harm in 15-year-old adolescents: a pilot study with a modified version of the Deliberate Self-Harm Inventory. *Scandinavian Journal of Psychology*, 48(1), 33-41.

Lundh, L. G., Wangby-Lundh, M., Paaske, M., Ingesson, S., & Bjarehed, J. (2011). Depressive Symptoms and Deliberate Self-Harm in a Community Sample of Adolescents: A Prospective Study. *Depression Research and Treatment*, 1-11.

MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual review of psychology*, 58, 593. doi: 10.1146/annurev.psych.58.110405.085542

Madge, N., Hawton, K., McMahon, E. M., Corcoran, P., De Leo, D., de Wilde, E. J., . . . Arensman, E. (2011). Psychological characteristics, stressful life events and deliberate self-harm: findings from the Child & Adolescent Self-harm in Europe (CASE) Study. *European Child & Adolescent Psychiatry*, 20(10), 499-508. doi: 10.1007/s00787-011-0210-4

- Marchetto, M. J. (2006). Repetitive skin-cutting: Parental bonding, personality and gender. *Psychology and Psychotherapy: Theory, Research and Practice*, 79(3), 445-459. doi: 10.1348/147608305X69795
- Marganska, A., Gallagher, M., & Miranda, R. (2013). Adult attachment, emotion dysregulation, and symptoms of depression and generalized anxiety disorder. *American Journal of Orthopsychiatry*, 83(1), 131-141. doi: 10.1111/ajop.12001
- Martin, G., Swannell, S. V., Hazell, P. L., Harrison, J. E., & Taylor, A. W. (2010). Self-injury in Australia: a community survey. *Medical Journal of Australia*, 193(9), 506-510.
- Mikulincer, M., & Florian, V. (1998). The relationship between adult attachment styles and emotional and cognitive reactions to stressful events. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 143-165). New York: Guilford Press.
- Mikulincer, M., & Orbach, I. (1995). Attachment styles and repressive defensiveness: The accessibility and architecture of affective memories. *Journal of Personality and Social Psychology*, 68, 917-925.
- Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion*, 27(2), 77-102. doi: 10.1023/A:1024515519160
- Møhl, B., & Skandsen, A. (2012). The prevalence and distribution of self-harm among Danish high school students. *Personality and Mental Health*, 6(2), 147-155.
- Montebarocci, O., Codispoti, M., Baldaro, B., & Rossi, N. (2004). Adult attachment style and alexithymia. *Personality and Individual Differences*, 36(3), 499-507. doi: 10.1016/S0191-8869(03)00110-7
- Moran, P., Coffey, C., Romaniuk, H., Olsson, C., Borschmann, R., Carlin, J. B., & Patton, G. C. (2012). The natural history of self-harm from adolescence to young adulthood: a population-based cohort study. *The Lancet*, 379(9812), 236-243.
- Morey, C., Corcoran, P., Arensman, E., & Perry, I. J. (2008). The prevalence of self-reported deliberate self-harm in Irish adolescents. *BMC Public Health*, 8(79).
- Morgan, H. G., Burns-Cox, C. J., Pocock, H., & Pottle, S. (1975). Deliberate self-harm: clinical and socio-economic characteristics of 368 patients. *The British Journal of Psychiatry*, 127(6), 564-574.

- Muehlenkamp, J. J. (2005). Self-injurious behavior as a separate clinical syndrome. *American Journal of Orthopsychiatry*, 75(2), 324-333.
- Muehlenkamp, J. J., Claes, L., Havertape, L., & Plener, P. L. (2012). International prevalence of adolescent non-suicidal self-injury and deliberate self-harm. *Child and Adolescent Psychiatry and Mental Health*, 6. doi: 10.1186/1753-2000-6-10
- Muehlenkamp, J. J., & Gutierrez, P. M. (2004). An Investigation of Differences Between Self-Injurious Behavior and Suicide Attempts in a Sample of Adolescents. *Suicide and Life-Threatening Behavior*, 34(1), 12-23. doi: 10.1521/suli.34.1.12.27769
- Muehlenkamp, J. J., & Kerr, P. L. (2010). Untangling a complex web: How non-suicidal self-injury and suicide attempts differ. *Prevention researcher*, 17(1), 8-10.
- Muehlenkamp, J. J., Williams, K. L., Gutierrez, P. M., & Claes, L. (2009). Rates of non-suicidal self-injury in high school students across five years. *Archives of Suicide Research*, 13(4), 317-329. doi: 10.1080/13811110903266368
- Nock, M. K. (2010). Self-injury. *Annual Review of Clinical Psychology*, 6, 339-363.
- Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of consulting and clinical psychology*, 72(5), 885.
- Nock, M. K., & Prinstein, M. J. (2005). Contextual features and behavioral functions of self-mutilation among adolescents. *Journal of abnormal psychology*, 114(1), 140.
- Nock, M. K., Prinstein, M. J., & Sterba, S. K. (2010). Revealing the form and function of self-injurious thoughts and behaviors: A real-time ecological assessment study among adolescents and young adults.
- O'Connor, R. C., Rasmussen, S., Miles, J., & Hawton, K. (2009). Self-harm in adolescents: Self-report survey in schools in Scotland. *The British Journal of Psychiatry*, 194(1), 68-72. doi: 10.1192/bjp.bp.107.047704
- Oskis, A., Clow, A., Hucklebridge, F., Bifulco, A., Jacobs, C., & Loveday, C. (2013). Understanding alexithymia in female adolescents: The role of attachment style. *Personality and Individual Differences*, 54(1), 97-102. doi: 10.1016/j.paid.2012.08.023
- Paivio, S. C., & McCulloch, C. R. (2004). Alexithymia as a mediator between childhood trauma and self-injurious behaviors. *Child Abuse & Neglect*, 28(3), 339-354. doi: 10.1016/j.chiabu.2003.11.018

Patton, G. C., Hemphill, S. A., Beyers, J. M., Bond, L., Toumbourou, J. W., McMorris, B. J., & Catalano, R. F. (2007). Pubertal stage and deliberate self-harm in adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, 46(4), 508-514. doi: 10.1097/chi.0b013e31803065c7

Perez, J., Venta, A., Garnaat, S., & Sharp, C. (2012). The difficulties in Emotion Regulation Scale: Factor structure and association with nonsuicidal self-injury in adolescent inpatients. *Journal of Psychopathology and Behavioral Assessment*, 34(3), 393-404. doi: 10.1007/s10862-012-9292-7

Picardi, A., Toni, A., & Caroppo, E. (2005). Stability of alexithymia and its relationships with the 'Big Five' factors, temperament, character, and attachment style. *Psychotherapy and Psychosomatics*, 74(6), 371-378. doi: 10.1159/000087785

Plener, P. L., Libal, G., Keller, F., Fegert, J. M., & Muehlenkamp, J. J. (2009). An international comparison of adolescent non-suicidal self-injury (NSSI) and suicide attempts: Germany and the USA. *Psychological Medicine*, 39(9), 1549-1558. doi: 10.1017/S0033291708005114

Portzky, G., De Wilde, E. J., & van Heeringen, K. (2008). Deliberate self-harm in young people: differences in prevalence and risk factors between the Netherlands and Belgium. *European Child & Adolescent Psychiatry*, 17(3), 179-186.

Preacher, K. J. (2001, April). Calculation for the chi-square test: An interactive calculation tool for chi-square tests of goodness of fit and independence [Computer software]. Available from <http://quantpsy.org>.

Resch, F., Parzer, P., & Brunner, R. (2008). Self-mutilation and suicidal behaviour in children and adolescents: Prevalence and psychosocial correlates: Results of the BELLA study. *European Child & Adolescent Psychiatry*, 17(Suppl 1), 92-98. doi: 10.1007/s00787-008-1010-3

Rodham, K., Hawton, K., & Evans, E. (2004). Reasons for deliberate self-harm: Comparison of self-poisoners and self-cutters in a community sample of adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, 43(1), 80-87. doi: 10.1097/00004583-200401000-00017

Skegg, K. (2005). Self-harm. *The Lancet*, 366(9495), 1471-1483. doi: 10.1016/S0140-6736(05)67600-3

- Shek, D. T., & Yu, L. (2012). Self-harm and suicidal behaviors in Hong Kong adolescents: prevalence and psychosocial correlates. *The scientific world journal*, 2012, 932540. doi: 10.1100/2012/932540
- Shin, Y. M., Chung, Y. K., Lim, K. Y., Lee, Y. M., Oh, E. Y., & Cho, S. M. (2009). Childhood predictors of deliberate self-harm behavior and suicide ideation in Korean adolescents: a prospective population-based follow-up study. *Journal of Korean Medical Science*, 24(2), 215-222. doi: 10.3346/jkms.2009.24.2.215
- Sornberger, M. J., Heath, N. L., Toste, J. R., & McLouth, R. (2012). Nonsuicidal self-injury and gender: Patterns of prevalence, methods, and locations among adolescents. *Suicide and Life-Threatening Behavior*, 42(3), 266-278. doi: 10.1111/j.1943-278X.2012.0088.x
- Sourander, A., Aromaa, M., Pihlakoski, L., Haavisto, A., Rautava, P., Helenius, H., & Sillanpaa, M. (2006). Early predictors of deliberate self-harm among adolescents. A prospective follow-up study from age 3 to age 15. *Journal of Affective Disorders*, 93(1-3), 87-96. doi: 10.1016/j.jad.2006.02.015
- Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & human development*, 7(4), 349-367.
- Stanford, S., & Jones, M. P. (2010). How much detail needs to be elucidated in self-harm research? *Journal of Youth and Adolescence*, 39(5), 504-513. doi: 10.1007/s10964-009-9492-y
- Stepp, S. D., Morse, J. Q., Yaggi, K. E., Reynolds, S. K., Reed, L. I., & Pilkonis, P. A. (2008). The role of attachment styles and interpersonal problems in suicide-related behaviors. *Suicide and Life-Threatening Behavior*, 38(5), 592-607. doi: 10.1521/suli.2008.38.5.592
- Stroup, D. F., Berlin, J. A., Morton, S. C., Olkin, I., Williamson, G. D., Rennie, D., ... & Thacker, S. B. (2000). Meta-analysis of observational studies in epidemiology: a proposal for reporting. *Jama*, 283(15), 2008-2012.
- Tasca, G. A., Szadkowski, L., Illing, V., Trinneer, A., Grenon, R., Demidenko, N., . . . Bissada, H. (2009). Adult attachment, depression, and eating disorder symptoms: The mediating role of affect regulation strategies. *Personality and Individual Differences*, 47(6), 662-667. doi: 10.1016/j.paid.2009.06.006
- Taylor, G. J., Bagby, R. M., & Parker, J. D. (1999). *Disorders of affect regulation: Alexithymia in medical and psychiatric illness*. Cambridge University Press.

Troisi, A., D'Argenio, A., Peracchio, F., & Petti, P. (2001). Insecure attachment and alexithymia in young men with mood symptoms. *The Journal of nervous and mental disease*, 189(5), 311-316.

Tsai, M. H., Chen, Y. H., Chen, C. D., Hsiao, C. Y., & Chien, C. H. (2011). Deliberate self-harm by Taiwanese adolescents. *Acta Paediatrica*, 100(11), e223-e226. doi: 10.1111/j.1651-2227.2011.02357.x

Van der Kolk, B. A., Perry, J. C., & Herman, J. L. (1991). Childhood origins of self-destructive behavior. *American journal of Psychiatry*, 148(12), 1665-1671.

Wan, Y. H., Hu, C. L., Hao, J. H., Sun, Y., & Tao, F. B. (2011). Deliberate self-harm behaviors in Chinese adolescents and young adults. *European Child & Adolescent Psychiatry*, 20(10), 517-525. doi: 10.1007/s00787-011-0213-1

Watanabe, N., Nishida, A., Shimodera, S., Inoue, K., Oshima, N., Sasaki, T., . . . Okazaki, Y. (2012). Deliberate self-harm in adolescents aged 12–18: A cross-sectional survey of 18,104 students. *Suicide and Life-Threatening Behavior*, 42(5), 550-560. doi: 10.1111/j.1943-278X.2012.00111.x

Waters, E., Merrick, S., Treboux, D., Crowell, J., & Albersheim, L. (2000). Attachment security in infancy and early adulthood: a twenty-year longitudinal study. *Child development*, 71(3), 684-689.

Waters, S. F., Virmani, E. A., Thompson, R. A., Meyer, S., Raikes, H. A., & Jochem, R. (2010). Emotion regulation and attachment: Unpacking two constructs and their association. *Journal of Psychopathology and Behavioral Assessment*, 32(1), 37-47. doi: 10.1007/s10862-009-9163-z

Weierich, M. R., & Nock, M. K. (2008). Posttraumatic stress symptoms mediate the relation between childhood sexual abuse and nonsuicidal self-injury. *Journal of Consulting and Clinical Psychology*, 76(1), 39-44. doi: 10.1037/0022-006X.76.1.39

Weinberg, A., & Klonsky, E. D. (2012). The effects of self-injury on acute negative arousal: A laboratory simulation. *Motivation and Emotion*, 36(2), 242-254. doi: 10.1007/s11031-011-9233-x

West, P., & Sweeting, H. (2003). Fifteen, female and stressed: Changing patterns of psychological distress over time. *Journal of Child Psychology and Psychiatry*, 44(3), 399-411. doi: 10.1111/1469-7610.00130

Whitlock, J., Eckenrode, J., & Silverman, D. (2006). Self-injurious behaviours in a college population. *Pediatrics*, 117, 1939-1948.

Wichstrøm, L., & Rossow, I. (2002). Explaining the gender differences in self-reported suicide attempts: A nationally representative study of Norwegian adolescents. *Suicide and Life-Threatening Behavior*, 32(2), 101-116. doi: 10.1521/suli.32.2.101.24407

Wilkinson, P., & Goodyer, I. (2011). Non-suicidal self-injury. *European Child & Adolescent Psychiatry*, 20(2), 103-108. doi: 10.1007/s00787-010-0156-y

Whitlock, J., Muehlenkamp, J., Purington, A., Eckenrode, J., Barreira, P., Baral Abrams, G., . . . Knox, K. (2011). Nonsuicidal self-injury in a college population: General trends and sex differences. *Journal of American College Health*, 59(8), 691-698. doi: 10.1080/07448481.2010.529626

Yates, T. M., Tracy, A. J., & Luthar, S. S. (2008). Nonsuicidal self-injury among 'privileged' youths: Longitudinal and cross-sectional approaches to developmental process. *Journal of Consulting and Clinical Psychology*, 76(1), 52-62. doi: 10.1037/0022-006X.76.1.52

You, J., Leung, F., & Fu, K. (2012). Exploring the reciprocal relations between nonsuicidal self-injury, negative emotions and relationship problems in Chinese adolescents: A longitudinal cross-lag study. *Journal of Abnormal Child Psychology*, 40(5), 829-836. doi: 10.1007/s10802-011-9597-0

You, J., Leung, F., Fu, K., & Lai, C. M. (2011). The prevalence of nonsuicidal self-injury and different subgroups of self-injurers in Chinese adolescents. *Archives of Suicide Research*, 15(1), 75-86. doi: 10.1080/13811118.2011.540211

Zetterqvist, M., Lundh, L.-G., Dahlström, Ö., & Svedin, C. G. (2013). Prevalence and function of non-suicidal self-injury (NSSI) in a community sample of adolescents, using suggested DSM-5 criteria for a potential NSSI disorder. *Journal of Abnormal Child Psychology*, 41(5), 759-773. doi: 10.1007/s10802-013-9712-5

Zlotnick, C., Shea, M. T., Pearlstein, T., Simpson, E., Costello, E., & Begin, A. (1996). The relationship between dissociative symptoms, alexithymia, impulsivity, sexual abuse, and self-mutilation. *Comprehensive Psychiatry*, 37(1), 12-16. doi: 10.1016/S0010-440X(96)90044-9