

**An exploratory study of deliberate self-harm in a South African student population**

**by**

**Christiaan van Rooyen**

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### Abstract

This cross-sectional study aimed to generate an exploratory functional model of deliberate self-harm (DSH) occurring among a South African student population (n = 603) using Principle Component Analysis (PCA). A battery of instruments, including the Deliberate Self-Harm Inventory (DSHI) and the Functional Assessment of Self-Mutilation (FASM) were administered to students. Following Nock and Prinstein's (2004) four-factor model on the functions of DSH, self-reported reasons for DSH on the FASM were conceptualised in light of the reinforcement mechanisms of social learning theory. PCA revealed a four-factor model for the reasons students engaged in DSH, constituent of the following components: *social positive reinforcement, social negative reinforcement, automatic reinforcement, and reinforcement regarding self-image*. A unique factor manifests in the self-image reinforcement component, suggesting divergence in the functions of DSH between student and adolescent populations.

*Keywords:* exploration, deliberate self-harm, students, principle component analysis, Functional Assessment of Self-Mutilation, factor, social learning theory, general population, Deliberate Self-Harm Inventory, survey.

## Table of Contents

Abstract.....	2
List of Tables .....	6
List of Figures .....	7
Introduction.....	<b>Error! Bookmark not defined.</b>
Background.....	8
Statement of the Problem.....	9
Purpose of the Study .....	10
Research Questions.....	10
Hypothesis.....	10
Significance of the Study .....	10
Theoretical Framework.....	11
Social learning theory.....	11
Definition of Terms.....	13
Organisation of the Study .....	13
Literature Review.....	15
Conceptualising deliberate self-harm .....	15
Structural review of deliberate self-harm .....	19
Forms of DSH.....	19
Prevalence.....	20
Correlates.....	21
Sociodemographic correlates.....	21

Distal correlates. ....	23
Proximal correlates. ....	25
Functional review of deliberate self-harm .....	26
Functional models. ....	28
Method .....	34
Procedure .....	34
Participants.....	35
Measures .....	35
Demographic questionnaire. ....	35
Functional Assessment of Self-Mutilation.....	35
Deliberate Self-Harm Inventory. ....	36
Data Analytic Plan .....	37
Results.....	39
Sample description.....	39
DSHI .....	41
Frequency and characteristics of DSH.....	41
Gender.....	42
Race.....	45
FASM.....	45
Principle component analysis. ....	45
Discussion .....	51

Structural Features .....	51
Functional Features .....	52
Limitations and Recommendations.....	54
References.....	57

**List of Tables**

Table 1. The Four-Factor Functional Model.....	29
Table 2. Frequency and Characteristics of DSH by Gender .....	44
Table 3. Principle Components Analysis .....	47
Table 4. Frequency of Endorsement of Factors by Gender and Race .....	50

### List of Figures

Figure 1. Sample Breakdown by Race.....	39
Figure 2. Participants by Race and Gender.....	40
Figure 3. Age Distribution of Sample.....	40
Figure 4. Reported History of Self-Harm .....	41

## An Exploratory Study of Deliberate Self-Harm in a South African Student Population

The idea that harming oneself could be beneficial seems paradoxical. Could there be any benefits in deliberately inflicting harm upon oneself, and why does this behaviour persist? Despite the seeming incongruous nature of this behaviour, it is a very real (and prevalent) phenomenon for adolescents and young adults. As will be shown, this behaviour has mystified researchers and clinical practitioners for decades, and has been studied from a myriad of perspectives, yet insight into the reasons for this behaviour remains elusive.

This study aims to investigate the functions this perplexing behaviour serve for students enrolled at a tertiary educational institution, and compare these findings to an established functional model of deliberate self-harm developed from a sample of adolescent inpatients.

### **Background**

Deliberate self-harm (DSH), or the “intentional, direct injuring of body tissue without suicidal intent” (Klonsky, 2007, p. 227) is a phenomenon that has received increased attention in the media and scientific literature alike (Chapman, Gratz, & Brown, 2006; Zila & Kiselica, 2001). Although this behaviour has been clinically examined for over 75 years, there is paucity in knowledge of the underlying functions and psychological dynamics of deliberate self-harm (Suyemoto, 1998).

Terms that are often used interchangeably in literature on the topic include self-mutilation, self-destruction and self-injurious behaviour (Claes & Vandereycken, 2007). Several types of behaviour have been studied as methods of self-harm. Skin-cutting, where a sharp object is used to cut the body, has been reported as being the most common method of self-harm (Briere & Gill, 1998; Gratz, 2001). In a study by Gratz (2001) needle sticking was equally common, followed by severe scratching and hitting or banging oneself. Other methods of self-harm that are reported include carving words, pictures and other marks into

the skin, picking at the skin in order to prevent wounds from healing, biting oneself to the extent that the skin is broken, or deliberately breaking one's bones (Gratz, 2001). Harmful chemicals or sandpaper is also used to damage the skin. Most individuals who self-harm use multiple methods of self-harm and these behaviours can often result in injuries that are severe enough to require hospitalisation (Gratz, 2001). This behaviour has significant costs for personal and national health (Butler & Longhitano, 2008; Reid & Henry, 2002) and it tends to result in or exacerbate clinical disorders when it persists (Chapman et al., 2006).

### **Statement of the Problem**

Impressive advances have been made through the utilisation of functional assessment methods in the conceptualisation and treatment of clinical disorders, yet these methods have been surprisingly absent from the DSH literature (Nock & Prinstein, 2004). Furthermore, inquiries into this behaviour have mostly been done on adolescent inpatient samples, eschewing insight into other relevant population groups. Studies (Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Whitlock, Eckenrode, & Silverman, 2006) have indicated that adolescent and young adults in the general population are at a heightened risk toward engaging in this behaviour, with some studies finding prevalence rates of as high as 38% in college populations (Gratz, Conrad & Roemer, 2002).

One such functional assessment of DSH is that of Nock and Prinstein (2004). Termed the four-factor functional model, the authors generated a model of the functions of DSH from responses on the Functional Assessment of Self-Mutilation (FASM; Lloyd, 1998) using confirmatory factor analysis (see Methods chapter for a discussion of this instrument). This model differentiates between four functions of DSH, based on the principles of social learning theory (see the theoretical framework section below for a discussion of this). However, this model is based on the responses of a small sample of adolescent inpatients. Considering that adolescent inpatients and college students have different developmental

imperatives and varying social pressures, it is worth considering possible differences in the functions of DSH for these populations.

### **Purpose of the Study**

The purpose of the study is to explore the functions of DSH in a student population, using a cross-sectional survey design, and critically compare these to the functions of DSH as elucidated by Nock and Prinstein (2004). The functions will be established by performing a principle component analysis on the responses to the Functional Assessment of Self-Mutilation (FASM). Additionally, the structural features of DSH will be investigated for the current population using descriptive statistics, including the forms of DSH engaged in, prevalence and regularity of DSH, and demographic features associated with DSH.

### **Research Questions.**

1. Is there a fundamental difference between the functions of DSH among a student population and those functions of DSH indicated by the four-factor functional model?
2. What forms of DSH do students engage in?
3. Are there significant differences in the structural features of DSH among students when considering demographic variables such as age, race and gender?
4. How prevalent is DSH among this student population?

### **Hypothesis.**

Due to the exploratory nature of the study no hypotheses can be tested. It is, however, expected that the functions of DSH among students will have unique features from those identified by other functional models.

### **Significance of the Study**

The results of this study would enable a deeper insight into the functional aspects of DSH among students, which would inform treatment and intervention strategies aimed at this

population. Treatment, and even prevention, could be designed around the functions which are most relevant to this population. This exploration could also yield valuable information regarding any unique functions that may exhibit for this population, opening new avenues of investigation into this behaviour. Finally, an indication of the prevalence of DSH for the current population, as well as the forms of DSH engaged in, could assist policy makers in gauging the seriousness of the problem for the current population.

### **Theoretical Framework**

Although DSH is investigated from both structural and functional perspectives in this study, the primary objective is to explore the functions of DSH. The framework as proposed by Nock and Prinstein (2004) will be used as a guide toward this.

The four-factor functional model of Nock and Prinstein (2004) classifies the functions of DSH according to four functional classes, varying according to the dichotomous dimensions *automatic-social* and *positive-negative*. This model is rooted in social learning theory, which states that human learning is situated within the social context.

#### **Social learning theory.**

In the social learning system, novel patterns of behaviour stem from direct experiences of events and phenomena as well as through observations of others (Bandura, 1977). The former modality, which is considered to be the more rudimentary, is largely governed by the consequences of one's actions, which could consist of reward or punishment. This has the effect that certain behaviours or actions are strengthened, or reinforced, by the consequences of those behaviours, resulting in engagement of successful modes of behaviour, and the discarding of ineffectual ones (Bandura, 1977). In this sense, reinforcement serves an informative function, in that behaviour is performed according to the likelihood of having a successful (or desirable) outcome. Furthermore, reinforcement also serves a motivational function. Most human behaviour is not controlled by immediate external reinforcement, but

rather through the anticipated consequences of that behaviour, which is in turn based on previous experience. Human beings' capacity to represent actual outcomes symbolically allows future consequences to be converted into current motivators (Bandura, 1977).

This reward vs. punishment motivation function is exemplified in the *positive-negative* dimension of the four-factor functional model. Based on the assumption that behaviour is reinforced through its consequences, the introduction of positive consequences and the removal of negative ones serve as motivators for the behaviour. Therefore, the model assumes that DSH behaviour that introduces positive consequences (e.g. a state of calmness, attention from others) or removes negative ones (e.g. negative emotions), will be reinforced and therefore reproduced.

The origin of these consequences could also be internal or external. Internal consequences, such as an improved emotional state, are considered *automatic*, while consequences stemming from external factors are considered *social* (e.g. attention from others). Therefore, DSH behaviour is classified, according to the four-factor functional model, according to the introduction and removal of potential consequences, as well as the locus of these consequences. See the discussion on the four-factor functional model in the literature review for more detail.

The observational learning component of social learning theory could also explain how DSH behaviours are initiated in a social context. Through observation of others engaging in these behaviours, and the consequences of these behaviours, individuals can attempt to produce desirable consequences for themselves. This may have particular relevance to in-patient populations exposed to such behaviours on a more regular basis.

## Definition of Terms

The following list of definitions is provided to ensure uniformity of the use and understanding of these terms throughout the study. All definitions developed by other authors are referenced:

**deliberate self-harm:** “the deliberate, direct destruction or alteration of body tissue without conscious suicidal intent, but resulting in injury severe enough for tissue damage (e.g., scarring) to occur” (Gratz, 2001, p. 253).

**function:** The purpose, reason or motivation underlying a specific behaviour.

**functional analysis:** An analysis focussing on the underlying psychosocial functions of a given behaviour.

**structural analysis:** An analysis focussing on the topographical features and associated symptoms/correlates of a given behaviour.

**four-factor functional model:** A model developed by Nock and Prinstein (2004) that classifies the functions of DSH according to two dichotomous dimensions, *automatic-social* and *positive-negative*.

**self-image:** The conception or idea that a person has of themselves in general (Colman, 2008)

## Organisation of the Study

Chapter 1 has presented the introduction, background, problem statement, purpose, significance, theoretical framework, definition of terms, and the organisation of the study. Chapter 2 contains a focussed review of the related literature, addressing the conceptualisation of DSH, a structural review of DSH, as well as a functional review of DSH. The procedure, measures and the data analytic plan of the study will be discussed in Chapter

3. The results and findings of the study is presented in Chapter 4. Chapter 5 will conclude the study with a summary of the findings, conclusions drawn from the findings, a discussion on the results, as well as the limitations of the study and further research possibilities.

## Literature Review

The act of deliberately harming oneself is a perplexing behavioural phenomenon, which has recently received increased attention in the media and scientific literature alike (Chapman et al., 2006; Laye-Gindhu & Schonert-Reichl, 2005; Zila & Kiselica, 2001). Self-harming behaviour has been clinically examined for over 75 years (Suyemoto, 1998), and various attempts have been made to classify this behaviour in an insightful manner (Lloyd, 1998). This goal, however, is confounded by a lack of empirical evidence (Gratz, 2003), and a major challenge in the study of self-harming behaviour is the resultant lack of consensus regarding its definition and scope (Claes & Vandereycken, 2007).

Alarmingly, there is mounting evidence which suggests that the incidence of this phenomenon is on the rise (Klonsky, Oltmanns, & Turkheimer, 2003). Considering the consequences this behaviour has on personal and national health (Butler & Longhitano, 2008; Reid & Henry, 2002) and its tendency to result in or exacerbate clinical disorders when it persists (Chapman et al., 2006), further treatment-informing investigation into the forms and functions of this behaviour is necessitated (Gratz, 2003).

### Conceptualising deliberate self-harm

Currently, consensus regarding definitions of self-harming behaviour is limited. One source of the inconsistency in defining this behaviour is the interchangeable use of terms, such as deliberate self-harm, self-injury, self-mutilation (Gratz, 2003), self-damage, and self-aggression (Claes & Vandereycken, 2007). These multiple terms, coupled with the various catch-phrases associated with the behaviour, tend to confuse those interested in this behaviour (Lloyd, 1998). The lack of consensus regarding the definitions of self-harming behaviour also affects the operational definitions employed in research, and in effect, different researchers measure different constructs, which in turn compromises the generalisability of findings (Gratz, 2001; Suyemoto, 1998). Standardised, empirically

validated measures are necessary; although Fliege, Lee, Grim, and Klapp (2009) report that this is rarely used.

In order to find a clearer and more generalisable conceptualisation of self-harming behaviour, an explication of the various commonalities and differences between definitions is necessary. It is important in this regard to note the conceptual difference between structuralist and functionalist approaches toward defining this behaviour (Claes & Vandereycken, 2007). The former classifies behaviour according to its topographical features, and attempts to situate the behaviour within a pathological structure, or isolate it as the symptom of a disorder, while the latter classifies behaviours according to the functional processes at work in its development and maintenance (Claes & Vandereycken, 2007). As will become clear in subsequent parts, a functionalist approach is favoured in this research, even though defining criteria stemming from structuralist approaches are included in the conceptualisation of self-harming behaviour, as these are complementary in forming a comprehensive picture of the behaviour in question.

Most definitions include that the behaviour must be volitional, deliberate, and direct (as opposed to indirect harm, e.g. drinking and driving) (Lloyd-Richardson et al., 2007). Furthermore, in differentiating self-harming acts from other behaviours, Walsh and Rosen (1988) emphasises the following dimensions of self-harming behaviour: the severity of the physical damage inflicted, the psychological disposition of the individual prior to and during the act, and the acceptability of the act in society. Although the severity of the harm inflicted is not easily gauged (Fliege et al., 2009), some authors posit that the resultant damage of self-harming should be severe enough for tissue damage to occur, while more severe forms of self-harm, such as amputations, should be omitted from the definition (Gratz, 2003; White, Trepal-Wollenzier, & Nolan, 2002). Regarding the second dimension, converging evidence suggest that acute negative affect precedes incidents of self-harming behaviour, and that

negative affect decreases subsequent to such incidents (see Klonsky, 2007). Some behaviours where tissue damage result, such as tattooing and body piercing, are seen as culturally sanctioned forms of self-harm (Chapman et al., 2006), and are therefore not considered to be part of self-harm definitions. It is hence necessary to consider the motive or purpose of the behaviour within the social context in which the individual is involved when attempting to label this behaviour (Claes & Vandereycken, 2007).

Pathological self-harm has also been differentiated from behaviours associated with general cognitive impairment (Chapman et al., 2006), since the underlying psychological dynamics, developmental analogues and even severity thereof may differ significantly in such cases (Nock & Prinstein, 2004; Suyemoto, 1998). Although repetitive and stereotypical forms of self-harm are common in populations suffering from general cognitive impairment, other clinical populations, such as individuals with borderline personality disorder (BPD), as well as general non-clinical populations engage in self-harming behaviour when cognitive impairment is absent (Chapman et al., 2006). Behaviours and phenomena which are further excluded from this conceptualisation include those that are overt symptoms or diagnostic criteria of other disorders, such as substance abuse and eating disorders, everyday behaviours, for example unhealthy eating habits or lack of exercise, and self-harm of a psychological nature, for instance deliberately engaging in humiliating relationships with others (Fliege et al., 2009).

A central distinction that is made in the literature lies between self-harming behaviour and suicide and/or suicide attempts (Lloyd, 1998). This distinction is typically made on the basis of three characteristics: lethality, repetition, and intent or ideation (Guertin, Lloyd-Richardson, Spirito, Donaldson, & Boergers, 2001; Penn, Esposito, Schaeffer, Fritz, & Spirito, 2003). Self-harm is usually of low lethality, is highly repetitive (70.8% of subjects repeated the behaviour in a study by Whitlock et al., 2006), and only a small minority of

subjects report the presence of suicidal intent and ideation at the time of self-harming (Walsh & Rosen, 1988). It is often, however, difficult to differentiate between these two phenomena, and it is posited that in some cases individuals engage in self-harm to avoid suicide (this dynamic will be discussed in a subsequent section) (Claes & Vandereycken, 2007).

Moreover, Pattison and Kahan (1983) exclude overdoses from their definition, as these cases are too ambiguous to be classified as self-harm. In cases where self-harming behaviour and suicide attempts coincide, it has been associated with greater cognitive/affective and behavioural symptoms (Guertin et al., 2001). Other research (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006) indicate a significant overlap between self-harming behaviour and suicide attempts, elucidating associations between characteristics such as the length of history of self-harm, number of methods of self-harm, and the absence of physical pain during self-harm with instances of suicide attempts. Further research is necessary in order to differentiate these behaviours on important clinical characteristics, such as motivation and intent (Lloyd, 1998).

This latter distinction has important consequences for the conceptualisation of self-harming behaviour. Chapman et al (2006), although specifying that the intent to die is absent in self-harming behaviour, subsumes their definition of self-harm under the broader category of parasuicidal behaviour, in which intent to die may or may not be present. In contrast to this, Cloutier, Martin, Kennedy, Nixon, and Muehlenkamp (2009) uses the same term employed by Chapman et al, namely deliberate self-harm (DSH), as an umbrella term for completed and attempted suicides in addition to self-harming behaviour. Consistent with the latter usage, Claes and Vandereycken (2007, p. 138) prefer the term self-injury, stating that self-harm “...in the English literature, usually refers to suicide attempts... and may also include indirect modes of self-damaging behaviors such as particular habits of eating, drinking, and smoking.”

The term deliberate self-harm, or DSH, will be used in the current study, as this is the most accepted term for auto-destructive acts in the literature (Fliege et al., 2009). The use of DSH as definition in this study is aligned to conceptions that exclude suicidal intent. It 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 (e.g., scarring) to occur” (Gratz, 2001, p. 253). Furthermore, it is a suitable term as DSH appears to have the least negative connotation, especially when considering the stigma attached to this behavioural phenomenon (Gratz, 2001).

The remainder of this review on the nature of DSH will be divided according to structural and functional approaches in studying this behaviour, as proposed by Claes and Vandereycken (2007). It is important to note that overlap in these conceptual systems is inevitable, but it remains practical to study DSH according to this framework, as it provides a clearer understanding of not only the behaviour in question, but also the ways in which it is studied.

### **Structural review of deliberate self-harm**

Researchers studying DSH from a structural or syndromal approach usually look for the ‘typical’ features of self-harming, and how it relates to other identified pathologies (Claes & Vandereycken, 2007).

#### **Forms of DSH.**

A wide range of DSH behaviours have been identified in the literature, the most common of which is skin cutting, followed by biting, scratching and punching oneself (Briere & Gil, 1998). Another study by Gratz (2001) also found cutting to be the most prevalent form alongside needle sticking, followed by severe scratching. Due to the pervasiveness of self-cutting many authors restrict their samples to cutters (Suyemoto, 1998). Other self-harming behaviours include banging ones head against objects, biting, rubbing glass into the skin,

burning oneself with lighters, matches or cigarettes, and even breaking bones (Gratz, 2001). Areas of the body which are commonly affected include arms, wrists and hands, legs, stomach, head, and chest (Favazza & Conterio, 1989; Whitlock et al., 2006). Most individuals who self-harm use multiple methods and tend to repeat this behaviour (Gratz, 2001; Suyemoto, 1998; Whitlock et al., 2006).

### **Prevalence.**

According to the literature, the age of onset of DSH could be as early as 7 years of age for less severe forms, but usually peaks during middle to late adolescence (14 - 16 years), while it is less likely to occur over the age of 24 (Briere & Gil, 1998; Whitlock et al., 2006).

Despite a growing concern that DSH is increasing in prevalence among adolescent and young adult populations, no reliable estimate exists for these populations in general, as what is known of these groups is derived from clinical samples and is rarely differentiated from suicide-related behaviours (Klonsky & Muehlenkamp, 2007; Whitlock et al., 2006). Current estimates range from 4% of adults in the general population having a history of self-injury, with 1% reporting a severe history (Briere & Gil, 1998; Klonsky et al., 2003), and rates ranging from 12- 46% for adolescents and young adults in the general population (Lloyd-Richardson et al., 2007; Whitlock et al., 2006). Gratz, Conrad and Roemer (2002) found an alarmingly high amount of reported incidences of DSH among a college population, with 38% of the sample (n = 133) reporting having engaged in DSH, 18% having harmed themselves more than 10 times, and 10% having harmed themselves more than 100 times in the past. Although there is little research available that compare prevalence rates between clinical and nonclinical populations (Briere & Gil, 1998), as would be expected, elevated rates are found for clinical samples: self-injury is prevalent in about 21% of adult psychiatric patients (Briere & Gil, 1998) and even as many as 82% of adolescent psychiatric inpatients

engage in self-harm (Nock & Prinstein, 2004). The latter is supported by Fliege et al's (2009) review of the literature.

### **Correlates.**

The term *risk factor* is often preferred to terms such as *causal factor*, as the relation between a factor and a particular behaviour is probabilistic rather than deterministic (Fliege et al., 2009). Furthermore, considering that the majority of research done on DSH utilised cross-sectional designs, many variables cannot be considered risk factors, as it is necessary to measure these variables before the outcome occurs (Fliege et al., 2009). Therefore, the term *correlate* is preferred in this research to refer to variables that are empirically associated with DSH. The distinction between *sociodemographic*, *distal* and *proximal* factors as utilised by Fliege et al (2009) will also be employed in the current research. Distal factors refer to factors arising earlier in a person's biography that are related to DSH (such as childhood trauma) while proximal factors occurs closer to the onset of DSH (which may act as 'triggers' toward DSH).

### **Sociodemographic correlates.**

#### ***Gender.***

There is a general perception in the literature that DSH is more prevalent among females than males (see Klonsky et al., 2003; Suyemoto, 1998), but this may not be the case. While some studies on clinical samples indicate significantly higher prevalence among women (67% for women vs. 53% for men; Zlotnick, Mattia, & Zimmerman, 1999), other clinical studies have found no such differences (Briere & Gil, 1998; Nijman et al., 1999). Gratz (2001) found no significant differences in the rates of DSH among female and male undergraduate psychology students (34% and 38%, respectively). In their systematic review of the DSH literature, Fliege et al (2009) indicate 6 studies finding no evidence for different

prevalence rates in adults, 1 study finding higher prevalence among females in a sample of medical patients, 6 studies indicating higher prevalence of DSH among female adolescents as opposed to male adolescents, and 1 study on adolescents finding no difference in prevalence between genders. The evidence on differential prevalence rates for gender is complex (Fliege et al., 2009), and requires further investigation.

Differences between gender regarding forms of DSH and areas of the body affected have been found. Females have been found to carve words into the skin significantly more than males do (12% vs. 2%; Gratz, 2001). According to Whitlock et al (2006), females are 2.3 times more likely to scratch or pinch themselves and 2.4 times more likely to cut, while males are 2.8 times more likely to punch objects with the intent of harming themselves. Furthermore, males are 1.8 times more likely to injure their hands while females are more likely to injure their wrists (2.3 times more likely) and thighs (2.3 times; Whitlock et al., 2006). Functional differences between genders will be discussed in the functional review of DSH.

### ***Ethnicity.***

In a study on a community sample of adolescents, Lloyd-Richardson et al (2007) found Caucasians to be significantly more likely to engage in DSH than African Americans. Caucasians were also more likely to engage in moderate to severe forms of DSH while African Americans were more likely to engage in minor forms of DSH. A recent study on a large adolescent sample (Latzman et al., 2009) found significant interaction effects between gender and race, with African American boys reporting the highest rates of DSH among all groups studied. Whitlock et al (2006) found that only Asians or Asian Americans were significantly less likely to repeatedly engage in DSH than Caucasians in a community sample of college students.

**Distal correlates.*****Parent-child relationship.***

A large volume of research on DSH has investigated the influence of stressful traumatic experiences during childhood, unanimously finding associations between these and DSH (Fliege et al., 2009). Significant factors that have been identified include psychological problems on the part of the parent, parental separation, and early or prolonged separation from a parent.

***Childhood sexual abuse.***

A controversial area in the study of DSH is the role of childhood sexual abuse in the development of the behaviour. In their review of the relationship between these two factors, Fliege et al (2009) identified 21 studies finding a relationship between DSH and sexual abuse. They do however mention that the retrospective design of the majority of studies on the subject is prone to recall biases, which may lead to both over- and underreporting of biographical events.

In a meta-analysis of the DSH-childhood sexual abuse issue, Klonsky and Moyer (2008) conclude that theories which posit a casual role of childhood sexual abuse in the development of DSH are not supported by empirical evidence, but rather that these two are modestly related due their correlation with the same psychiatric risk factors (childhood sexual abuse accounts for little or no unique variance in DSH when psychiatric risk factors are controlled for). It is important to keep in mind that although childhood sexual abuse may play a central role in some individuals' self-harm behaviour, many who have been abused do not self-harm, and many who self-harm have not been abused (Klonsky & Muehlenkamp, 2007).

### *Comorbidity.*

The presence of DSH behaviour has been correlated with a number of psychological disorders (Bjärehed & Lundh, 2008; Skegg, Nada Raja, & Moffitt, 2004), and indeed a higher prevalence has been found for clinical samples as opposed to general samples (21% vs. 4%; Briere & Gil, 1998). In a study by Whitlock et al (2006), the prevalence of mental health conditions increased from cases where DSH was not present, to cases where a single incident of DSH were present, to cases of repeat DSH. However, due to an almost exclusive focus on clinical and forensic populations, estimates of the association between self-harm and psychiatric disorders could also be inflated (Klonsky et al., 2003). In this regard, Suyemoto (1998) posits that the majority of studies on clinical inpatient populations are possibly biased toward more severely disordered patients.

Specific diagnoses that are correlated with DSH include eating disorders (Bjärehed & Lundh, 2008), Schizophrenia (Burgess, 1991), Obsessive Compulsive Disorder (Wilhelm et al., 1999), and personality disorders, most notably Borderline Personality Disorder (Burgess, 1991). Klonsky et al (2003), studying a large group of nonclinical subjects using self- and peer report measures, found higher scores of borderline, schizotypal, dependant, and avoidant personality disorder symptoms for participants with a history of DSH than those without such histories. Because of the strong traditional association between borderline personality disorder and DSH, bias toward diagnoses of the former is possible (Ghaziuddin et al., 1992, as cited in Suyemoto, 1998).

When compared to adolescent suicide attempters who do not engage in DSH, self-harming suicide attempters are more often diagnosed with oppositional defiant disorder, major depression, and dysthemia (Guertin et al., 2001).

**Proximal correlates.**

According to Fliege et al (2009), the available literature on DSH provide good correlative and prognostic evidence linking psychopathology in the form of anxiety, depression, and aggressiveness to DSH. Adolescent suicide attempters who engage in DSH score higher on measures of hopelessness, anger, risk taking, reckless behaviour, substance use, pathological family functioning, and loneliness than their non-DSH counterparts (Guertin et al., 2001). Klonsky et al (2003) found anxiety to play a prominent role in the psychopathology of nonclinical self-harmers. Loneliness seems to be a significant predictor of DSH, with those reporting being lonely being five times more likely to engage in DSH (Guertin et al., 2001). Furthermore, individuals who engage in DSH experience negative emotions more frequently and with higher intensity than those who do not self-harm, which may be a principle reason for self-harm, as self-harm may relieve emotional distress (see following section) (Fliege et al., 2009). Penn et al's (2003) results reiterate the relationship between affective symptoms and DSH, finding significantly more severe affective symptoms among suicidal and self-harming youths than non-suicidal, non-self-harming youths in a juvenile correctional facility.

Studying a sample of adolescent psychiatric inpatients, Nock and Prinstein (2005) found that DSH is typically performed impulsively, without alcohol or drug use, and in the absence of physical pain. They suggest that the impulsiveness associated with the act of DSH highlight the role of immediate internal and external contingencies as primary antecedents to the behaviour as opposed to long-term decision-making processes and planning. It is however mentioned that that this pattern is likely associated with established and repeating DSH, while long-term decision-making and planning precedes the initiation of DSH (Nock & Prinstein, 2005).

### **Functional review of deliberate self-harm**

When employing a functionalist approach in the study of DSH, researchers focus on the psychosocial functions that DSH serve, looking for specific, idiographic meanings of the behaviour for the individual (Claes & Vandereycken, 2007; Daffern & Howells, 2002). According to Klonsky (2007), in the context of DSH, functions are variables that motivate and reinforce self-harming behaviour. Studying DSH from this approach is challenging due to the behaviour's complexity and contextual embedment (Claes & Vandereycken, 2007), as well as the fact that its various functions may co-occur and overlap conceptually (Klonsky, 2007; Suyemoto, 1998). It is however necessary to attempt to differentiate these functions as it aids in our understanding of the various reasons individuals engage in this behaviour (Suyemoto, 1998). Impressive advances have been made in the conceptualisation, assessment, and treatment of clinically relevant behaviour through functional approaches, even though such research have been surprisingly absent from previous conceptualisations of DSH (Nock & Prinstein, 2004). Furthermore, studies on the functional aspects of DSH tend to target clinical inpatient populations, specifically adolescents, often using small samples (see (Lloyd-Richardson et al., 2007; Nock & Prinstein, 2004). The current study utilised self-report measures in studying the functional determinants of DSH in a large non-clinical college sample ( $n = 603$ ), which allows for (a) examination of reinforcement variables that are automatic (e.g. arising from within the individual), which are less detectable by external informants, (b) an assessment of DSH outside of inpatient settings (Nock & Prinstein, 2004), and (c) large amounts of data to be captured at the same time and setting (Babbie, 2008).

There has been a myriad of reasons put forth as hypotheses as to the functions of DSH (Suyemoto, 1998). One of the earliest attempts to classify DSH behaviour by Menniger (1938; as cited in Lloyd, 1998) also shed light on the possible functions that this behaviour may serve. Of the six forms of DSH discussed by Menniger, especially religious self-

mutilation, neurotic self-mutilation, and puberty rites offer clarification as to why non-psychotic individuals would engage in DSH. Self-chastisement in the form of religious self-mutilation could serve as self-punishment and a mechanism for dealing with guilt; neurotic self-mutilation could be interpreted as a way of dealing with anxiety and other symptoms of neuroticism; and puberty rites highlight a social aspect of the behaviour.

Some attempts have been made to classify the various functions of DSH by means of factor analyses or by review of the literature, yet most of these typifications lack a unifying theoretical framework in which the functions of DSH can be understood. For example, Briere and Gil (1998) identified 9 functions of DSH through factor analysis of self-reported reasons for engaging in DSH, which are: 1) to decrease dissociative symptoms, especially depersonalisation and numbing; 2) to reduce stress and tension; 3) to block upsetting memories and flashbacks; 4) to demonstrate a need for help; 5) to ensure safety and self-protection; 6) to express and release stress; 7) to reduce anger; 8) to disfigure self as punishment; and 9) to hurt oneself in lieu of others. From a review of the functions of DSH in the empirical literature, Klonsky (2007) identified 7 functions of DSH, namely 1) affect regulation; 2) anti-dissociation; 3) anti-suicide; 4) interpersonal boundaries; 5) interpersonal-influence; 6) self-punishment; and 7) sensation seeking, while Gratz (2003) state that the clinical literature indicates that DSH may function in one or more of the following ways: to relieve anxiety; to release anger; to relieve unpleasant thoughts and feelings; to release tension; to relieve feelings of guilt, loneliness, alienation, self-hatred, and depression; to externalise and concretise emotional pain; to provide a sense of security; to provide a sense of control; to self-punish, to set boundaries with others; to terminate depersonalisation and derealisation; to end flashbacks; and to stop racing thoughts. Functional models which situate these various functions within specific theoretical frameworks will be discussed next.

### **Functional models.**

Suyemoto (1998), from a review on the literature, constructed six functional models of DSH behaviour under four major categories- *environmental, drive, affect regulation, and interpersonal*. These models will be discussed accordingly.

#### ***The environmental model.***

As the name suggests, this model focuses on the interaction between the individual who engages in DSH and his or her environment. Theory from both behavioural and systemic developmental traditions is incorporated, emphasising how the behaviour is initiated and maintained, serving both the individual and the system simultaneously. Social learning theory is especially relevant to this model, with its emphasis on social and automatic reinforcement, as well as the mechanisms of modelling. Accordingly, the functions of DSH is understood as originating from either modelling of others or through associating the behaviour with desirable outcomes, and is maintained through reinforcement, either automatically (i.e. internally) through feeling generation or avoidance, or socially, via the responses of the individual's family, peers, and caregivers. A prime example of an environmental model of the functions of DSH is Nock and Prinstein's (2004) four-factor functional model:

#### ***Four-factor functional model.***

The four factor functional model of DSH was developed from narrative case reports and theoretical reviews, as well as from experimental studies of stereotypic self-injurious behaviours (Nock & Prinstein, 2004). On the basis of these sources, it was proposed that DSH serves four primary functions that differ along two dichotomous dimensions: contingencies that are *automatic* versus *social*; and reinforcement that is *positive* (i.e. the result of the presentation of a desired stimulus) versus *negative* (i.e., followed by the removal of an aversive stimulus).

Table 1

*The Four-Factor Functional Model*

	<b>Automatic</b>	<b>Social</b>
<b>Positive</b>	Creation of a desirable psychophysiological state	Gaining attention from others/ gaining access to materials
<b>Negative</b>	Reduction in tension or other negative affective states	Escape from interpersonal task demands

*Automatic-negative reinforcement* refers to the use of DSH towards the reduction of tension or other negative affective states. This is the most common explanation of the function of DSH in the literature, and there is some empirical evidence to support this (Nock & Prinstein, 2004). A model focussed specifically on the automatic-negative reinforcement properties of DSH, the Experiential Avoidance Model (Chapman et al., 2006) will be discussed later in this section. *Automatic-positive reinforcement*, on the other hand, refers to feeling generation, i.e., the creation of a desirable psychophysiological state.

In contrast to the above, social reinforcement functions refer to the modification or regulation of the individual's social environment (Nock & Prinstein, 2004). *Social-negative reinforcement* functions in such a way as to provide escape from interpersonal task demands, while *social-positive reinforcement* for DSH serves to gain attention from others, or gain access to materials. Much clinical lore surrounds the latter, especially in the case of adolescents and patients diagnosed with Borderline personality disorder, yet little empirical evidence exist in support of these claims.

The four factor functional model has been subjected to scrutiny via confirmatory factor analysis on data collected from a sample of clinically referred adolescents, and has been found to be a reliable model in explaining the functions of DSH (Nock & Prinstein, 2004; 2005). The current study aims to evaluate this model on the DSH behaviour of a

significantly different population, namely non-clinical university students. Furthermore, the current study utilises a significantly larger sample than that used in the original study. Should similarities be found between these populations, the strength of the model will be improved, while any differences may expound specifics on the differences between the functions of DSH between the two populations. The four factor model is a uniquely encompassing model, and further examination of its validity could serve towards better understanding and treatment of DSH in various populations.

Another environmental model, resembling the automatic-negative reinforcement function identified in the four-factor model, will be discussed accordingly.

*The Experiential avoidance model (EAM).*

The EAM (Chapman et al., 2006) proposes that DSH is primarily maintained by negative reinforcement in the form of escape from, or avoidance of, unwanted emotional experiences. As the focus of the current study is on the four factor functional model, further investigation into one of its most pertinent aspects, i.e., automatic-negative reinforcement, would serve to clarify the underlying logic of the model.

As mentioned earlier, the perception that DSH primarily functions in such a manner as to avoid or terminate unwanted feelings dominates the literature of the functions of DSH. Researchers are beginning to delineate the potential mechanisms by which DSH may offer escape from such feelings, such as the release of endogenous opioids, providing distraction from unwanted emotional arousal, or being used as a self-punishment function that reduces arousal (Chapman et al., 2006). Furthermore, Chapman et al (2006) discusses structural characteristics placing the self-harming individual at a heightened risk for experiential avoidant behaviour, which the reader is referred to as this falls beyond the scope of this review.

Although the EAM provides much needed insight into the functions of DSH, it is necessary to investigate the alternative functions which DSH may serve from a behavioural perspective. Lesser understood functions, such as those that are socially reinforced, need to be evaluated to provide a clearer overall picture of the behaviour, as well as to understand DSH outside of clinical populations.

The remainder of the functional models identified by Suyemoto (1998) will be discussed in the light of the four factor model (and specifically, the EAM, where it is relevant) to indicate the flexibility of this overarching model in interpreting DSH according to the behavioural tradition.

### ***The antisuicide model.***

As mentioned earlier in this review, most authors agree that DSH is distinct from suicide in intent, lethality, phenomenology, and associated features (Suyemoto, 1998). According to the antisuicide model, DSH serve as a compromise between life and death drives, acting as an active coping mechanism used to avoid suicide. When this psychoanalytic developmental perspective is substituted with a behavioural one, the antisuicide model can be understood according to the dimensions discussed in the four factor model. DSH may function in such a manner as to provide escape from unwanted suicidal thoughts and feelings (through automatic-negative reinforcement, see EAM), or even to communicate these feelings to others (social-positive reinforcement).

### ***The sexual model.***

Another drive model rooted in the psychoanalytic developmental tradition, the sexual model, proposes that self-mutilation offers sexual gratification, punishes for or attempts to avoid sexual feelings or actions, or attempts to control sexuality or sexual maturation (Suyemoto, 1998). Interpreting this model through the four factor model, it can be argued that the sexual gratification offered by DSH can be a form of feeling generation (automatic-

positive reinforcement), self-punishment could function as a replacement for feelings of guilt (automatic-negative), and controlling sexuality as a mixture of automatic and social reinforcement behaviours.

***The affect regulation model.***

Primarily rooted in ego psychology, the affect regulation model posits that DSH may be used in order to express emotion and conflict to the self and others, and to establish a sense of control over those emotions (Suyemoto, 1998). Notwithstanding ego and drive interpretations of the mechanisms of this expression and attempts at control, the four factor model (and specifically the EAM) provides a cogent explanation of these functions through both the automatic/social and positive/negative dimensions.

***The dissociation model.***

In accordance with the affect regulation model, the dissociation model ascribes the function of DSH to the regulation of affect, but specifically toward maintaining a sense of self in the face of overwhelming emotions (Suyemoto, 1998). The function of anti-dissociation can, as in the case of the affect regulation function, be understood as an automatic-negative reinforcement function. Furthermore, Klonsky (2007) notes that feeling generation is another term for the anti-dissociation model of self-injury, as the physical sensations produced by self-harm may help the individual feel something, thus ending episodes of dissociation, depersonalisation, or derealisation.

***The boundaries model.***

Rooted in object relations and self-psychology developmental theory, the boundaries model has much in common with the two preceding models regarding feeling regulation, but in this sense the motif relates to creating boundaries between the self and others. DSH performs the function of creating a distinct and separate self-representation of the self

(Suyemoto, 1998). This may happen when perceived abandonment creates intense emotions which overwhelm the individual's sense of boundaries, leading the individual to experience the loss of other as a loss of self. Again, this mechanism could be interpreted in behavioural terms, as the creation of boundaries between the self and others could be seen as a form of feeling generation.

It is important to keep in mind that, while the four-factor functional model of DSH seem to offer a solution toward unifying the various theoretical perspectives regarding the functions of DSH, the approach used in treating DSH is very much dependant on the training and the theoretical perspectives subscribed to by the practitioner. Also, in certain cases it may be possible that much needed detail could be omitted when using a too broad approach. It does however, provide a broad theoretical framework in which DSH could be empirically studied, which may have positive consequences in the study of such a perplexing behavioural phenomenon.

## Method

Archival data from a 2009 exploratory study at the University of Pretoria was used, for which ethical clearance was given from the University's Research Ethics and Proposal Committee. This original study targeted a convenience sample of under- and postgraduate students enrolled for psychology modules at the university. Convenience samples consist of research participants drawn from groups of people that the research find it convenient to sample from, but is limited by its representativeness of the study population (Whitley, 2002). A survey design was employed in the 2009 study, which entails a sample of respondents completing standardised questionnaires (Babbie, 2008). Using questionnaires allow for anonymity and also permits for a large amount of data to be captured at the same time and setting.

An explication of the data collection methods used in the parent study follows.

## Procedure

Data were collected by making contact with participants in lecture halls during the presentation of the psychology modules that they were enrolled for. The data gathering sessions were arranged in advance to avoid disruption of classes. Information about the proposed study as well as instructions for completing the questionnaires were provided, including an explanation of the sensitive nature of the study. Students were presented with the opportunity to withdraw, should they have refused participation. Students received a battery of five questionnaires, an information letter and a letter of informed consent. Questionnaires were completed in class, and participants were allowed sufficient time to complete the questionnaires. Participants were also allowed to complete them at home and return them at a later stage, although most of the participants completed the questionnaires in class. After the questionnaires were completed and handed in, students were given the opportunity to ask questions surrounding the study. Feedback and further information about

the study were provided at the conclusion of the session. Data were then coded by research assistants, and cleaned by the principle researcher and the Department of Psychology's research assistant. The author was present through much of the process, including data gathering and coding.

The data for the current study were supplied to the author by the principle researcher of the above mentioned study, who is also the author's thesis supervisor.

### **Participants**

The sample consisted of 603 students enrolled for undergraduate and honours level psychology courses. See results section for a discussion of the sample.

### **Measures**

A total of five questionnaires were used in the original study by the University of Pretoria staff researcher, of which only three were utilised for the current study. These will be discussed accordingly.

#### **Demographic questionnaire.**

Information captured by this questionnaire includes: age, gender, race, language and level/year of study. No identifying details, such as names or student numbers were captured in order to ensure anonymity.

#### **Functional Assessment of Self-Mutilation.**

The Functional Assessment of Self-Mutilation (FASM) was developed to assess the methods, frequency and functions of self-harm (Lloyd, Kelley, & Hope, 1997). In this regard, functions refer to the psychological mechanisms that DSH serve. In the original research project, the Deliberate Self-Harm Inventory (DSHI, discussed next) was used to assess the methods and frequency of self-harm; therefore only the second part of the FASM was used. It consists of 22 statements assessing the functions of DSH (e.g. "to let others know how

desperate you were”) on a four-point Likert scale (response categories ranging in an ordinal fashion from *never* to *often*). The items are based on prominent theories of motivations for self-harm, including affect regulation, anti-dissociation, interpersonal influence and self-punishment theories (Lloyd, 1998). The psychometric properties of the FASM have been established in numerous studies (Guertin et al., 2001; Lloyd-Richardson et al., 2007; Nock & Prinstein, 2004). For example, Guertin et al (2001) reported adequate levels of internal consistency for both moderate and severe forms of self-harming behaviours ( $r = .65 - .66$ ) and indicated its concurrent validity with measures of suicidal ideation and the presence of past suicide attempts.

### **Deliberate Self-Harm Inventory.**

The DSHI is a 17-item, behaviourally based, self-report questionnaire developed by Gratz (2001) to assess DSH. Various aspects of DSH are assessed by this measure, including frequency, duration, severity, and type of self-harming behaviour. Each of the items, representing 16 methods of self-harm behaviour (and a 17<sup>th</sup> self-specified DSH behaviour), consists of a dichotomous contingency variable of whether the behaviour has been engaged in, a dichotomous variable to indicate whether hospitalisation was required, and two open ended questions on the frequency and duration of the behaviour where amounts and durations are to be supplied, respectively. The methods of DSH included in this measure were derived from clinical observations, common reports in the literature, and testimonies of individuals who engage in DSH. High levels of internal consistency has been reported ( $\alpha = .82$ ), along with acceptable test-retest reliability (Gratz, 2001). The DSHI is also significantly, moderately correlated with other measures of self-harm as well as a measure of borderline personality organisation (see Gratz, 2001).

### **Data Analytic Plan**

Data were analysed according to the structural and functional features of DSH. Descriptive statistics were used to determine the frequency and characteristics of DSH, while an exploratory principle component analysis (PCA) was used to reveal the underlying factors, or functions, of DSH behaviour.

Chi-square tests were performed to establish significant differences for gender and race regarding lifetime presence of DSH, and engagement in specific methods of DSH (dichotomous variables). T-tests were performed to establish differences in the number of methods of DSH engaged in, age of onset, and frequency of DSH for gender. Multivariate analysis of variance was performed to establish significant differences in the frequencies of engagement of each of the 17 items of the DSHI for both gender and race. This was due to the multiple, related dependent variables involved in the analysis, in order to safeguard against Type I error. Where a significant overall effect was identified, follow-up univariate analyses were performed, after the appropriate Bonferonni adjustments were made to the exceedance probability.

The resulting factors of the PCA were interpreted according to Nock and Prinstein's (2004) four-factor model, which has established structural validity and reliability. Factors were named after comparisons were made to how Nock and Prinstein assigned items to factors in their CFA. The structure remained remarkably similar to those of Nock and Prinstein, therefore the naming of the factors followed their convention. In cases where items did not load on specific factors as specified by Nock and Prinstein, alternative interpretations were supplied. A unique factor manifested, which after an investigation of commonality between its constituent items, was interpreted to be related to self-image (see results chapter).

The frequency of endorsement of each of the four factors were established by assigning each of the items on the FASM to one of four dummy variables representing the

factors identified by the CFA, and any responses other than ‘never’ were subsequently counted.

Structural analyses were done on the complete sample of 603 participants, while the functional analysis was done only on those participants who reported self-harm on the DSHI. It is important to note in this regard that only participants who answered affirmatively to questions of engagement (a contingency question) of any of the methods specified in the DSHI were considered as self-harmers, even though, in some cases, actual frequencies were provided for engagement in this behaviour without said affirmative answers. Due to this, some inconsistency is evidenced in item totals for the DSHI (see results chapter).

An alpha level of .05 was used for all statistical tests described above.

## Results

### Sample description

The sample consisted of 603 participants, of which 48.3% ( $n = 291$ ) indicated that they have engaged in DSH at least once. Sample breakdown by race were as follows: 8 (1.3%) Asian, 97 (16.1%) Black/African, 7 (1.2%) Coloured, 480 (79.6%) White, and 1 (0.2%) Other races not specified. A total of 10 (1.7%) values were missing for the race variable. Regarding the sex of the participants, 19.9% ( $n = 120$ ) were male and 80.1% ( $n = 483$ ) were female. The ages of participants ranged between 17 and 49, with a mean of 19.88 years.

Figure 1

*Sample Breakdown by Race*

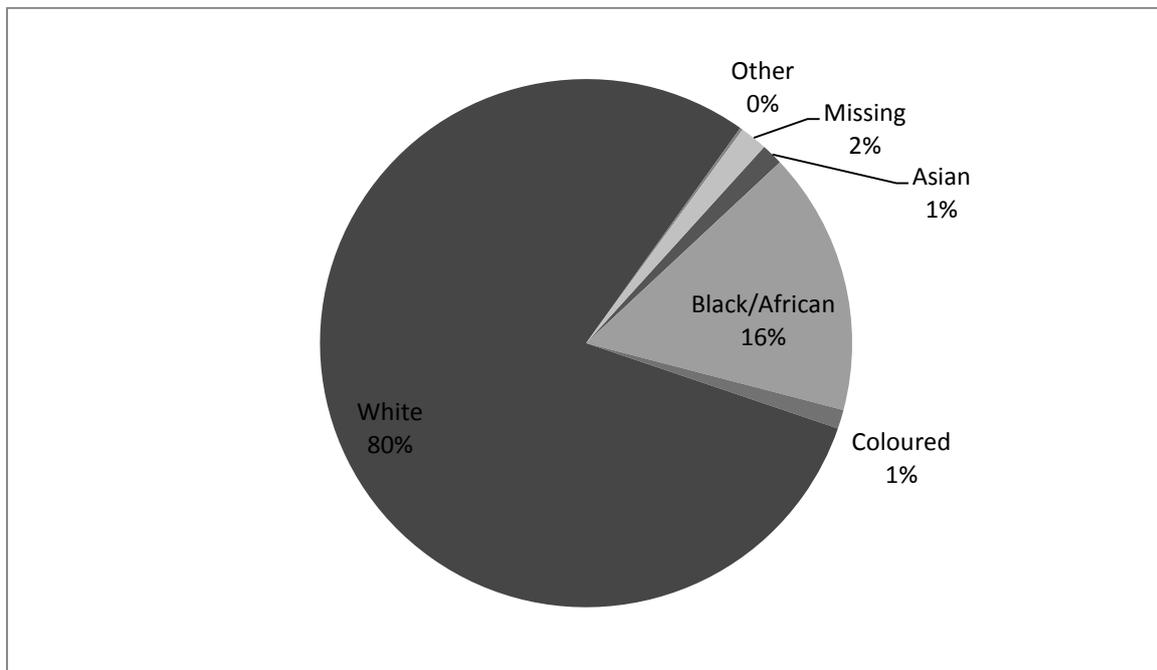


Figure 2

*Participants by Race and Gender*

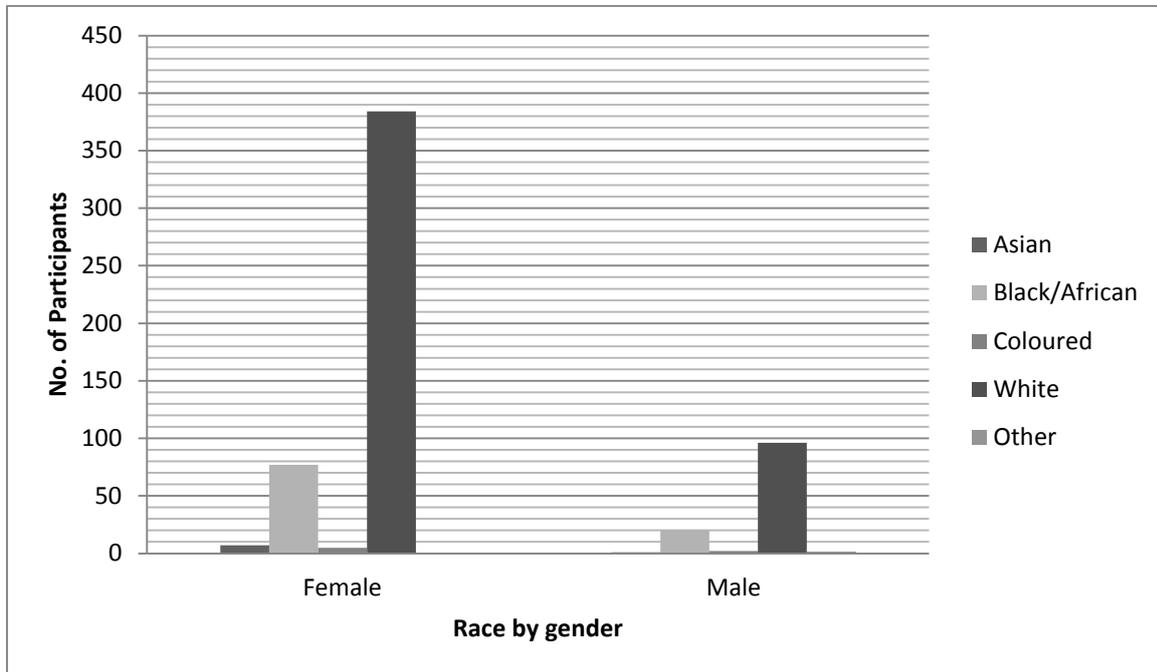
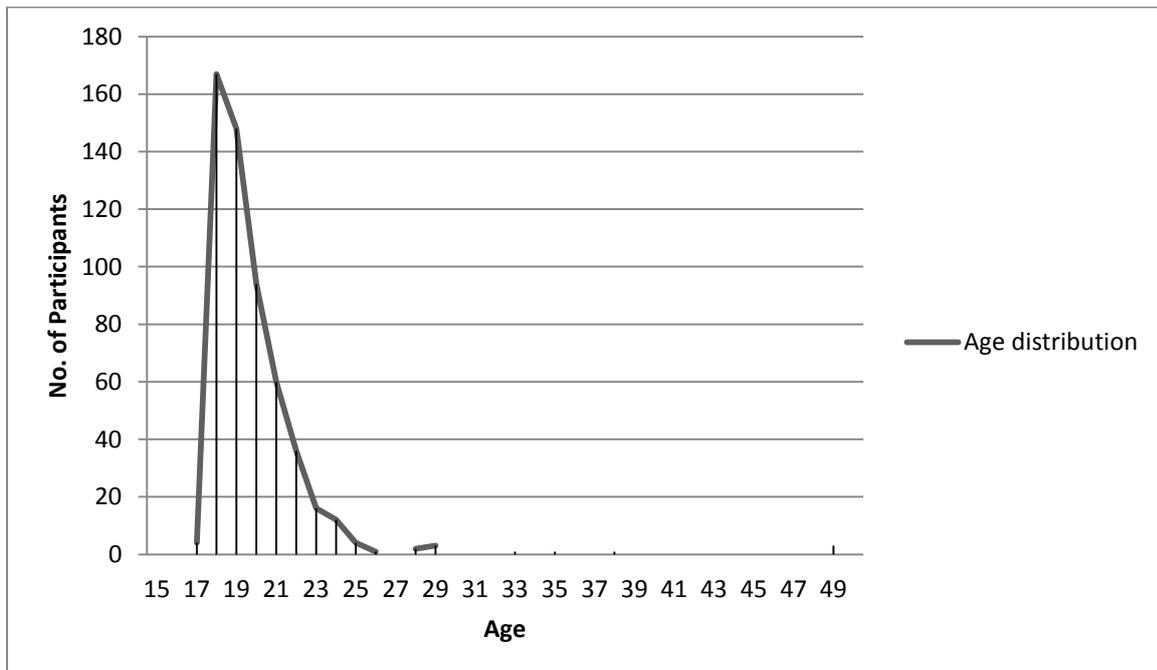


Figure 3

*Age Distribution of Sample*



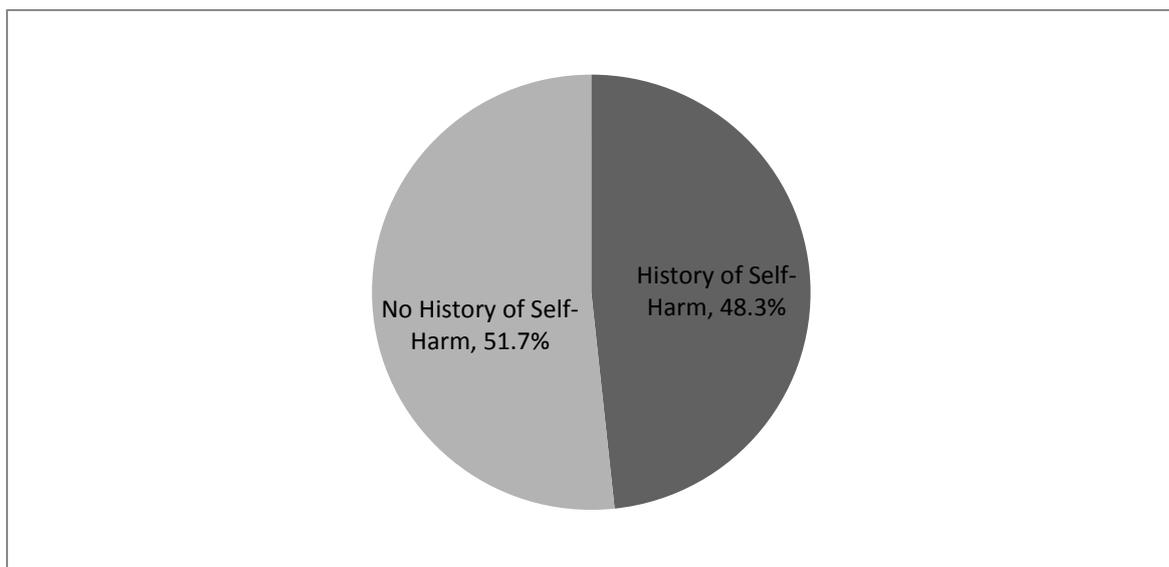
## DSHI

### Frequency and characteristics of DSH.

Overall, 48.3% of the sample ( $n = 603$ ) reported engaging in at least one incident of DSH during their lifetime, while 37% (223) reporting having engaged in at least one incident of DSH during the last 11 months (76.6% of those that reported an incident of DSH during their lifetime also indicated at least one incident during the last 11 months). A mean of 24.9 lifetime DSH incidents ( $SD = 105.3$ ,  $Mode = 1.0$ , range = 1-1510) were reported by those with histories of DSH. The overwhelming majority of these cases (78.2%) reported having engaged in more than one instance of DSH, with 38.7% reporting 10 or more lifetime incidents of DSH. Only 53.2% of the sample reported using multiple methods of DSH (vs. 46.8% who reported using only a single method), with 24% of the sample reporting having engaged in 4 forms or more during their lifetime. Consistent with the literature, the mean age of onset for DSH for lifetime occurrence was during adolescence ( $M = 13.8$ ,  $SD = 3.3$ ,  $Mode = 16$ , range = 2-23).

Figure 4

#### *Reported History of Self-Harm*



### Gender.

In contrast with some findings in the literature, no significant differences were found between the presence of lifetime DSH among the sexes (Male = 50%, Female = 52.2%;  $\chi^2(1, 603) = 0.18, p = .67$ ), as well as no significant differences between the sexes regarding the number of methods of DSH engaged in ( $M_{\text{male}} = 2.4, M_{\text{female}} = 2.6; t(248) = .59, p = .56$ ). Furthermore, there were no significant gender difference for age of onset ( $M_{\text{male}} = 14.2, M_{\text{female}} = 13.7; t(264) = 1.0, p = .32$ ) or frequency of DSH ( $M_{\text{male}} = 23.7, M_{\text{female}} = 25.2; t(269) = .10, p = 9.2$ ).

Regarding the different forms of DSH, cutting ( $\chi^2(1, 271) = 7.72, p = .005$ ), carving words into skin ( $\chi^2(1, 271) = 8.18, p = .004$ ), and severe scratching ( $\chi^2(1, 271) = 6.74, p = .009$ ) were significantly more prevalent among self-harming women, with burning with cigarettes ( $\chi^2(1, 271) = 6.62, p = .01$ ) and burning with lighters or matches ( $\chi^2(1, 271) = 5.15, p = .023$ ) being more prevalent among their male counterparts. These results suggest females engaging in DSH are more likely to harm themselves with cutting and scratching while males are more likely to burn themselves.

One-way multivariate analysis of variance (MANOVA) revealed the overall effect of gender on the frequencies of the different types of DSH engaged in to be non-significant,  $F(17, 253) = 1.65, p = 0.54$ ), although a test of between-subject effects revealed significant effects for gender on the frequency of the specific methods of burning with cigarettes ( $M_{\text{male}} = 1.7, M_{\text{female}} = 1.9; F(1, 253) = 9.72, p = 0.02$ ), carving words into skin ( $M_{\text{male}} = 0.2, M_{\text{female}} = 0.8; F(1, 253) = 4.34, p = 0.38$ ), sticking pins, needles, or staples into skin ( $M_{\text{male}} = 2.0, M_{\text{female}} = .9; F(1, 253) = 4.0, p = 0.47$ ), and banging one's head ( $M_{\text{male}} = 1.0, M_{\text{female}} = 0.2; F(1, 253) = 4.15, p = 0.43$ ). It seems that, even though males are more likely to burn themselves with cigarettes, self-harming females burn themselves more frequently, as well as

carving words into their skin more often. Males stick sharp objects into their skin and bang their heads more often than females.

Table 2

*Frequency and Characteristics of DSH by Gender*

Self-Harm Behaviour	All Females				All Males				Self-Harming Females				Self-Harming Males				Total			
	Incidents	Mean	Prevalence*	Percentage	Incidents	Mean	Prevalence*	Percentage	Incidents	Mean	Prevalence*	Percentage	Incidents	Mean	Prevalence*	Percentage	Incidents	Mean	Prevalence*	Percentage
Cutting	2122	4.39	114	23.6	269	2.42	18	15.0	2122	9.87	110	51.2	269	4.80	17	30.4	2391	3.97	132	21.9
Burning with cigarette	55	0.11	27	5.6	57	0.48	15	12.5	55	0.26	27	12.6	57	1.02	15	26.8	112	0.19	42	7.0
Burning with lighter or match	121	0.25	45	9.3	59	0.49	21	17.5	121	0.56	45	20.9	59	1.05	20	35.7	180	0.30	66	10.9
Carving words into skin	175	0.36	63	13.0	10	0.08	7	5.8	175	0.81	63	29.3	10	0.18	6	10.7	185	0.31	70	11.6
Carving pictures into skin	164	0.34	34	7.0	15	0.13	10	8.3	164	0.76	34	15.8	15	0.27	8	14.3	179	0.30	44	7.3
Severe scratching	1132	2.34	83	17.2	51	0.43	10	8.3	1132	5.27	78	36.6	51	0.91	10	17.9	1183	1.96	93	15.4
Biting	66	0.14	22	4.6	12	0.10	6	5.0	66	0.31	22	10.2	12	0.21	6	10.7	78	0.13	28	4.6
Rubbing sandpaper on skin	17	0.04	4	0.8	3	0.03	3	2.5	17	0.08	4	1.9	3	0.05	3	5.4	20	0.03	7	1.2
Dripping acid on skin	3	0.01	2	0.4	1	0.01	1	0.8	3	0.01	2	0.9	1	0.02	1	1.8	4	0.01	3	0.5
Using bleach or oven cleaner to scrub skin	27	0.06	5	1.0	504	4.20	3	2.5	27	0.13	5	2.3	504	9.00	3	5.4	531	0.88	8	1.3
Sticking pins, needles, staples into skin	196	0.41	39	8.1	114	0.95	13	10.8	196	0.91	39	18.1	114	2.04	13	23.2	310	0.51	52	8.6
Rubbing glass into skin	91	0.19	15	3.1	3	0.03	1	0.8	91	0.42	15	7.0	3	0.05	1	1.8	94	0.16	16	2.7
Breaking bones	3	0.01	3	0.6	4	0.03	2	1.7	3	0.01	3	1.4	4	0.07	2	3.6	7	0.01	5	0.8
Banging head	44	0.09	22	4.6	55	0.46	8	6.7	44	0.20	21	9.8	55	0.98	8	14.3	99	0.16	30	5.0
Punching self	276	0.57	37	7.7	61	0.51	11	9.2	276	1.28	34	15.8	61	1.09	11	19.6	337	0.56	48	8.0
Interfering with wound healing	685	1.42	35	7.2	19	0.16	4	3.3	685	3.19	33	15.3	19	0.34	4	7.1	704	1.17	39	6.5
Other forms of self-harm	261	0.54	40	8.3	61	0.51	12	10.0	261	1.21	35	16.3	61	1.09	12	21.4	322	0.53	52	8.6

\*Discrepancy due to failure to indicate engagement in a particular form of DSH, while reporting an amount of instances nonetheless. As DSH behaviours are counted only when an affirmative response is given regarding having ever engaged in any of the items in the DSHI (see methods section), and in some cases a number of instances of having engaged in said behaviour are supplied nonetheless, the overall prevalence differs slightly from the prevalence of those cases isolated as having a history of DSH.

**Race.**

A chi-square test of independence revealed no significant differences for lifetime prevalence of DSH between race,  $\chi^2(4, 603) = 8.93, p = .063$ . Although there were no significant differences between column proportions at the .05 level, 60% of the cells had expected values of less than 5 (2 races were underrepresented, including the category “Other”), which may influence the validity of findings based on this statistic. The race categories “Other” and “Coloured” have been omitted from all subsequent analyses as it consist of too few cases.

One-way MANOVA revealed a significant overall effect for race on the variables age of onset, total number of DSH incidents, and total number of forms of DSH engaged in ( $F(6, 464) = 2.65, p = 0.16$ ). After Bonferonni correction, follow-up univariate investigation revealed significant difference for the dependant variable “total number of forms of DSH engaged in” ( $F(2, 234) = 5.61, p < 0.17$ ), while a post-hoc Tukey’s HSD test indicated the significant difference to be between the races “Black/African” and “White”, with whites engaging in significantly more forms of DSH ( $M_{\text{Black/African}} = 1.41; M_{\text{White}} = 2.77$ ). No significant differences were found for age of onset and number of DSH incidents.

**FASM**

Internal consistency for the second part of the FASM, as used in the current study, was found to be very high, with a Cronbach’s alpha of .91.

**Principle component analysis.**

Using SPSS v.19, a principle component analysis (PCA) was conducted on the 22 items of the Functional Assessment of Self-Mutilation (FASM) with oblique rotation (direct oblimin), as it was assumed that the components would correlate significantly (see Nock & Prinstein, 2004). Sampling adequacy was confirmed using the Kaiser-Meyer-Olkin measure (.818; ‘great’ according to Field, 2009). Item 19 on the FASM (“to give yourself something

to do with others”) was excluded from subsequent analysis, as the KMO measure for this item fell below the accepted limit of 0.5 (Field, 2009), suggesting insufficient sample size for estimation of this particular item. All other KMO values for individual items fell in the range of .628 - .897, which are well above the accepted limit. Bartlett’s test of sphericity  $\chi^2(210) = 2076.47, p < .001$ , indicated sufficiently large correlations between items for PCA. Initial analysis revealed 5 components with eigenvalues above Kaiser’s criterion of 1, although a scree plot suggested a cut-off of 4 components. The analysis was redone with a set 4 components, which in combination explained 68.36% of the variance. These components were named<sup>1</sup> according to the constituent items of each, as they were assigned by Nock and Prinstein (2004) (see methods chapter).

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<sup>1</sup> The new factors and their constituent items were compared to those of Nock and Prinstein (2004), which were found to be closely related. Therefore, the factor naming was kept in line with those of Nock and Prinstein. Two of the factors as found in this analysis failed to conform to both the dichotomous dimensions of the four-factor model, with one (automatic reinforcement) conforming solely to the automatic-social dimension, and the second (self-image) not showing any agreement (discussed subsequently). The items included in this latter factor were investigated for a commonality, after which it was interpreted to consist of items specifically related to self-image.

Table 3

*Principle Components Analysis*

Reported reason	Social-positive reinforcement	Automatic reinforcement	Reinforcement regarding self-image	Social-negative reinforcement
To let others know how desperate you were	.818			
To try to get a reaction from someone, even if it's a negative reaction	.812			
To receive more attention from your parents or friends	.799			
To get attention	.772			
To get your parents to understand or notice you	.767			
To get other people to act differently or change	.636			
To make others angry	.528			
To get help	.417			
To stop bad feelings		.831		
To relieve feeling "numb" or empty		.780		
To feel something, even if it was pain		.775		
To punish yourself		.769		
To feel relaxed		.735		
To get control of a situation		.583		
To feel more part of a group			.857	
To be like someone you respect			.759	
To avoid having to do something unpleasant you don't want to do				-.784
To avoid school, work, or other activities				-.653
To avoid being with people				-.592
To give yourself something to do when alone				-.555
To avoid punishment or paying the consequences				-.455
<b>% of Variance<sup>2</sup></b>	46.10%	12.63%	5.46%	4.18%

<sup>2</sup> Five factors were initially identified with eigenvalues above 1, but after inspection of the scree plot, it was clear that four factors would be more parsimonious (the "break point" was at four factors- see previous discussion). These four factors explained 68.36% of the variance.

From this exploration, it seems that DSH functions in the following four ways: social-positive reinforcement (factor 1); automatic reinforcement (both positive and negative) (factor 2); reinforcement regarding self-image (factor 3); and social-negative reinforcement (factor 4). Interestingly, although this exploratory model has much in common with the 4 factor model of Nock and Prinstein (2004), which is based on the dichotomous dimensions *automatic-social* and *positive-negative* reinforcement, some critical differences are revealed. Firstly, a unique component manifests in factor 3, namely reinforcement regarding self-image. The constituent items on this component (“to feel more part of a group” and “to be like someone you respect”) suggest that some elements in the population of current study are uniquely motivated to engage in self-harm to augment their sense of identity, in relation to others. This factor transcends the dichotomous dimension of *automatic-social* reinforcement, as it relates to feelings originating from within oneself, but these feelings are also in direct relation to external loci of identity (e.g. group membership and modelling). Secondly, previous research on the functions of DSH found a significant bias toward automatic-negative reinforcement as the primary mechanism underlying self-harm behaviour; in the current study however, social-positive reinforcement items were equally endorsed as the reasons for DSH (see table 4). Furthermore, the exploratory model does not differentiate between automatic reinforcement variables along the *positive-negative* dimension, encompassing both feeling avoidance and feeling generation functions. Thirdly, the item “to give yourself something to do when alone” has a significant loading on the social-negative reinforcement factor. Although this item has been identified by Nock and Prinstein (2004) as belonging to the automatic-negative reinforcement factor, in the current study, it may be interpreted as a mechanism to remove feelings of boredom, especially due to social isolation or loneliness.

Regarding the frequency of endorsement of each of the four factors, social reinforcement factors (both positive and negative) are far more frequently endorsed than any

other factors (56.46% of participants endorsed social reinforcement items), in contrast to previous research and models, such as the EAM (Chapman et al., 2006; Nock & Prinstein, 2004). The reinforcement regarding self-image factor is endorsed far less frequently than the other factors (4.43%), consistently over gender and race variables. It seems that although this factor might be unique to the current population, it is not as common as the four factors identified in Nock and Prinstein's model. Furthermore, white females, although the largest group by gender and race ( $n = 172$ ), endorsed this item less than any other group considered by race and gender. Note that, due to a small number of cases in the racial groups Asian, Coloured, and Other not specified, these have been combined into a single group for analytic purposes.

Table 4

*Frequency of Endorsement of Factors by Gender and Race*

Function	Female				Male				Total
	Black	White	Other	Total	Black	White	Other	Total	
<b>Social-positive</b>	10 (33.33%)	65 (37.79%)	4 (36.36%)	79 (37.09%)	2 (40%)	19 (38.78%)	0	21 (37.5%)	100 (36.9%)
<b>Automatic</b>	9 (30.0%)	65 (37.79%)	4 (36.36%)	78 (36.62%)	2 (40%)	19 (38.78%)	1 (50%)	22 (39.29%)	100 (36.9%)
<b>Self-image</b>	2 (6.66%)	6 (3.48%)	0	8 (3.76%)	1 (20%)	3 (6.12%)	0	4 (7.14%)	12 (4.43%)
<b>Social-negative</b>	7 (23.33%)	29 (16.86%)	3 (27.27%)	39 (18.31%)	1 (20%)	12 (24.49%)	1 (50%)	14 (25.00%)	53 (19.56%)

## Discussion

In keeping with the structure of the rest of the thesis, the findings of the current study will be discussed according to structural and functional approaches. A discussion on the limitations and recommendations for further study will conclude this section.

### Structural Features

Overall, results indicate that DSH begins during early adolescence, is a repeated behaviour, and is performed using multiple methods, as reported by previous studies (see Nock & Prinstein, 2004). In agreement with findings from other studies (Gratz, 2001; Whitlock et al., 2006), the results indicated an alarmingly high rate (48.3%) of lifetime DSH among students. Perhaps more alarming, is the fact that these high rates have been found for non-clinical samples, justifying the concerns regarding the prevalence of this behaviour. Furthermore, no significant differences were found for rates of DSH between males (50%) and females (52.2%), which support a growing body of literature questioning structural differences between female and male self-harm.

Results indicating a preference for cutting and scratching DSH behaviours among females, and burning behaviours among males, have important repercussions for the study of DSH. As noted by Suyemoto (1998), some studies exclusively focus on samples that report cutting behaviour, which may be responsible for the apparent bias in the reporting of prevalence in the literature. As a consequence of female self-harmers' propensity to cut and scratch themselves, they become the subject of greater scrutiny in research operationalizing DSH as cutting behaviours, and are therefore over reported in the literature. The importance of a universal definition and operationalization of DSH is shown by this.

Due to the sample's erratic distribution regarding participants' race, analyses regarding this variable was considerably hampered. Results emerging from comparisons

between Black/African and White were the only viable results, and further investigation is needed to illuminate the probable unique structural and functional factors related to other racial groups in this population. Nevertheless, an important difference was found between these groups, in that white participants reported using significantly more methods of DSH compared to black/African participants.

Questions also arise concerning some of the seeming ‘innocuous’ behaviours (e.g. banging one’s head against walls) classified as DSH. The prevalence of DSH as reported by the results (and those of other studies) may be inflated due to the inclusion of behaviours that do not truly reflect the pathological nature of this behaviour. Further classification regarding the intensity of these behaviours is necessary. As is stands, there exist few commonalities between operationalisations of DSH, including the minimum number of incidents, intensity of the injuries sustained, and the frequency of this behaviour necessary to qualify this behaviour as pathological.

Apart from some key differences mentioned above, it seems that student populations are far more homogenous than anticipated when DSH is concerned.

### **Functional Features**

A principle component analysis was performed to elucidate the underlying factors, or functions, of DSH, in accordance with the methods used by Nock and Prinstein (2004). The PCA performed on the FASM revealed a factor structure that remained remarkably similar to Nock and Prinstein’s four-factor model. There were, however, important differences. A unique factor, when interpreted in the social learning framework, seems to be comprised specifically of functions which are related to an individual’s self-image. This factor has important implications when contrasted to the original four-factor model which was derived from a clinical sample of adolescents. It seems that, due to increased social pressures experienced by students, factors related to self-image act as catalysts toward DSH behaviour.

As mentioned in Nock and Prinstein (2004), it is possible that automatic-reinforcement functions are endorsed more frequently by inpatient adolescents due to their social isolation, and the resultant lack of opportunity for social influence. It follows that students, who are more exposed to these influences, may be uniquely motivated to engage in DSH because of how they perceive themselves in relation to others. This may have important implications for the treatment of DSH among students, as a new dimension, that of the social identity continuum, should be considered.

Another difference manifests in the lack of a positive-negative dimension in the automatic-reinforcement function. This critical difference raises questions about the validity of interpreting an exploratory factorial model on the merits of another model, which is in turn based on an established behavioural structure. Although it is possible that, for a student population, the lines between positive and negative reinforcement are dimmed when DSH is motivated by issues arising from within the individual, it detracts significantly from the structure of the original model, and more importantly, the theoretical framework on which it is based. Nevertheless, an exploration of this nature allows us a focussed insight into possible idiosyncrasies of a student population regarding DSH.

In contrast to previous research, social reinforcement functions were endorsed more frequently than automatic reinforcement functions. Again referencing Nock and Prinstein (2004), this inconsistency may be due to the social isolation inpatient adolescents experience, while university students are more exposed to social interaction. Interestingly though, the reinforcement regarding self-image factor was endorsed the least, indicating that, although this factor might be unique among this population, it is not a common function of DSH. Furthermore, white females on average endorsed this factor the least, which is in contrast to the expectation that this particular group is more at risk for DSH regarding self-image factors.

Caution should be exercised however when interpreting the frequency of endorsement of these factors due to the exploratory nature of this model.

As was expected, significant overlaps between the functions were evidenced. Results indicate that the functions of DSH do indeed co-occur, and overlap conceptually (Suyemoto, 1998). The latter is especially elucidated by the two functions that failed to conform to the *automatic-social* and *positive-negative* dimensions of the four-factor model.

Overall, it appears that DSH do serve unique functions for student populations, while retaining some of the structure of the four-factor functional model of DSH.

### **Limitations and Recommendations**

Although many methodological issues arise due to an exploratory investigation of this nature, it remains valuable to gauge the level of agreement between a model developed from an adolescent, inpatient population and one developed from a student population. Future research on this population, including confirmatory factor analyses on both models, would better our understanding of the functions of this perplexing behaviour. It is recommended that studies using confirmatory factor analyses be employed to investigate the fit of students' responses on the FASM to both the original four-factor functional model and the current exploratory model.

Although the high rates of DSH reported in this study are consistent with previous findings, they remain preliminary due to the exploratory nature of this study. The convenience sampling technique (undergraduate and honours psychology students), coupled with the self-report nature of the measures used, preclude us from generalising to the student population as a whole. Further, more systematic inquiry, using probability sampling techniques, is required to ensure an accurate depiction of the prevalence of this behaviour. It is also recommended that stratified sampling techniques be used to find more representative

samples from the heterogeneous population under study, as poor representation of certain population groups were witnessed in the current study.

The current study also did not investigate possible interaction effects between gender and race. Litzman et al (2009) found significant interaction effects for these variables regarding the frequency of DSH, pointing to the need to explore these interactions in more detail.

The recency of DSH behaviours in the conceptualisation and operationalization of DSH is another issue warranting discussion. The current study considered lifetime occurrence of DSH for functional analyses, but other, more appropriate temporal restrictions may exist. The FASM identifies DSH behaviour that took place during the preceding 12 months at the time of report, while the DSHI considers DSH during the preceding 11 months. Apart from the inconsistency witnessed in this study due to the use of both measures, there exist no temporal link between specific DSH behaviours and the functional mechanics that introduce and maintain these behaviours, which problematizes our understanding of the functions of DSH further. Longitudinal designs may address this issue by investigating the development of DSH, and allow for a more coherent classification of who qualifies as self-harmers based on the recency of self-harm. Furthermore, the four-factor functional model adequately explains how the DSH behaviours are reinforced, but it remains unclear how the behaviours are initiated to begin with. The social learning component of DSH needs to be investigated further, and in this regard longitudinal designs could be of use. It would be challenging, however, to sample cohorts that may be at risk for this behaviour to study the inception of DSH. It is recommended that future studies incorporate measures where participants identified as self-harmers are able to retrospectively indicate how and why they started self-harming in the first place.

The most pressing concern for the study of DSH regards its varying conceptualisations and operationalisations. In order to promote better understanding between researchers and clinicians involved with the study and treatment of DSH, it is imperative that a universally agreed upon definition for the behaviour be developed.

The findings of the current study also hold some promising insights into the prevention and treatment of DSH. First and foremost, educational interventions could be designed to inform various role players concerned with the mental health of students about the high prevalence of DSH among this population. As it stands, DSH poorly understood and many remain ignorant of the increasing seriousness and proliferation of this behaviour.

The strong social component implicated in the functions of DSH for students also point to the possibility of interventions designed around social support. In cases where DSH is engaged in to serve a positive-social reinforcement function, such as receiving attention from others, or even relaying negative feelings to others, it is reasonable to assume that opportunities to express these needs in more well-adjusted ways could defer students from these behaviours. Studies evaluating the efficacy of such interventions would go a long way in furthering our understanding of DSH.

Although deliberate self-harm remains a puzzling behavioural phenomenon, systematic inquiries of this kind allows us to develop an understanding of the seemingly paradoxical nature of the behaviour, and situate it within a broad, theoretically sound framework.

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