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Prevalence of self-mutilation seen in the cases of suicide at the Johannesburg Forensic Pathology Service

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Submitted in fulfillment of the requirements for the degree of Masters of Science in Medicine

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Johannesburg

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DECLARATION

I declare that this thesis is my own unaided work. It is being submitted for the degree of Master of Science (Medicine) in Forensic Medicine and Pathology at the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or any examination in any other University.

_____

DATE: _____

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Abstract

The act of self-mutilation has sparked much interest over the years. Various research has been conducted into this phenomena with researchers asking questions about why some individuals self-mutilate, what psychological functions self-mutilation may serve, who is most affected by self-mutilation and what are the links between self-mutilation and other forms of psychopathology. This research study considered the prevalence of self-mutilation seen in the cases of suicide at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary. This study was a prospective and descriptive study which considered the available literature on the phenomenon of self-mutilation and its link with suicide. This study also observed the external patterns of injury associated with the method of suicide as well as self-mutilation. It was found that self-mutilation is prevalent in 8 % of the suicide population in Johannesburg and that it was more common in men. The most common chosen method of suicide seen in this sample was that of toxicity of ingested substance. The second most common method of suicide in the self-mutilation was that of hanging. Future recommendations and future areas of research were also identified suggesting that there is still much information which needs to be gathered on the phenomenon of self-mutilation, especially within the South African context.

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Mortuary staff and Forensic Pathologists as they have helped through this process as well as providing me with the necessary facilities and support to conduct this research. A special thanks is given to Dr. Hansmeyer for her assistance in clarifying the correct forensic terminology used in this dissertation, as well as to Dr. Nkosi and Dr. Chikwava for their invaluable insight and assistance during autopsy.

And finally, and most importantly to all those who have departed from this world! I hope that I have been able to provide you with a voice and that this research will be able to help others who have been afflicted by self-mutilation and who are at risk for suicide.

Chapter 1: Introduction

"This pain I can see it but I can't feel it, it haunts me.

When I cut myself I can see where the pain is coming from and watch it heal

And I can easily care for it

'This' pain doesn't have a specific place

It moves around and creeps into strange places"

(Strong, 1998, pp. 5)

Self-mutilation has sparked much interest over the years. A variety of research has been conducted into this phenomena with researchers asking questions about why some individuals self-mutilate, what function self-mutilation serves, who is most affected by self-mutilation, what are the links between self-mutilation and psychopathology and how a history of self mutilation can increase ones risk for committing suicide. Self-mutilation is defined as, "the intentional act of tissue destruction" (Hicks & Hinck, 2008, p. 408) the purpose of which can vary across individuals from emotion regulation, self-punishment, and interpersonal influence as well as to reduce feelings of dissociation. Self-mutilation has also been defined as "self inflicted destruction of the body for purposes not socially sanctioned" (Whitlock & Knox, 2007, p. 634). For the purposes of this study, self-mutilation will be defined in terms of the above mentioned definitions provided by Hicks and Hinck (2008) and Whitlock and Knox (2007).

Self-mutilation is also known as para-suicide, symbolic wounding, focal suicide, self-abuse, self-injuring, local self destruction, auto-aggression and non-suicidal self-injury (Klonsky, Muehlenkamp, Lewis, & Walsh, 2011; Wenar & Kerig, 2010). Self-mutilation

can also take many forms, from scratching and biting to cutting and burning. In some severe instances, the individual may self-enucleate, self-castrate and even amputate entire limbs.

Self-mutilation is seen in many forms and in response to many different situations. Self-mutilation is commonly seen in people with borderline personality disorder, schizophrenia, dissociative identity disorder, eating disorders, anxiety disorders and in those who have been sexually and/ or physically abused (Cavanaugh, 2002; Klonsky, 2007; Oldham, Skodol & Bender, 2005; Resch, Parzer & Brunner, 2008). This behaviour can however also occur in people with obsessive compulsive disorder, substance abuse and in major depression. Self-mutilation varies with regards to when it is done, how it is done, what tool the self-mutilation was implemented with and why it is done. It also serves many functions for the individual and this can also vary across people and situations (Mikolajczak, Petrides & Hurry, 2009). Self-mutilation and its link with suicide is another important aspect of this behaviour which requires consideration, as it is seen that engaging in self-mutilation may increase the individuals risk for suicide. Self-mutilation is therefore a very complex phenomenon that requires further exploration.

The aim of this study was to determine the prevalence of self-mutilation in the suicide cases received at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary from July 2012 to February 2013, which is the percentage of self-mutilation cases in the suicide sample used in the study. The research question was: What is the prevalence of self-mutilation seen in cases of suicide at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary. The null hypothesis for this study is: that self-mutilation will not be present in the majority of the suicide population used in the study. The hypothesis is:

self-mutilation will be present in a small demographic of the suicide population (White individuals between the ages of 18 and 24 as this coincides with international literature). The importance of this study is to determine the prevalence of self-mutilation seen in the suicide population in Johannesburg. This is significant in that there are no reliable self-mutilation prevalence statistics in terms of suicide in Johannesburg or South Africa. It is necessary to consider whether self-mutilation is potentially a problem in certain aspects of the South African population and how self-mutilation may increase the risk for suicide as is seen in the international research (Klonsky et al., 2011). Research considering self-mutilation in a suicide population has not been considered, thus highlighting the importance of a study of this nature.

Chapter 2: Literature review

Self-mutilation is a complex phenomenon which needs to be considered in greater detail from a research perspective. This damaging behaviour has been shown to increase ones risk for suicide and that those engaging in self-mutilation show higher degrees of depression, hopelessness and suicidal ideation, thus increasing the risk of suicide in these individuals (Rissanen, Kylma, & Laukkanen, 2008). In this chapter the concept of self-mutilation will be considered from various perspectives.

2.1 THE IMPORTANCE OF UNDERSTANDING SELF-MUTILATION

Self-mutilation is particularly prevalent amongst adolescents and young adults. It is a phenomenon which has been present for an extended period of time and the numbers of those engaging in self-mutilation is increasing. This is especially problematic in that those who self-mutilate are prone to develop further psychological problems and often resort to the use of substances to control emotions and these individuals may even attempt or complete suicide at a later stage when the self-mutilating act does not achieve the required results anymore (Hicks & Hinck, 2008; Taghaddosineejad, Sheikhazadi, Yaghmaei, Vakilo, Saberi, & Behnoush, 2009).

People who self-mutilate often avoid treatment and therapy and this is one of the reasons why self-mutilation is so difficult to treat as well as why there is such a poor prognosis for those who injure themselves. It has also been noted that those who have used self-mutilation on more than two occasions are likely to self-mutilate more in the future (Hendershot, Stutson, & Adair, 2009). Hawton, Saunders & O'Connor (2012) have demonstrated how very few individuals engaging in self-mutilation seek

professional help and that many of those engaging in self-mutilation are at an increased risk for committing suicide.

2.2 PREVALENCE AND STATISTICS OF SELF-MUTILATION

According to Hicks and Hinck (2008) three million people in the United States of America either cut, burn or injure themselves in a self-mutilating act. The most common methods according to Rodham and Hawton (2009) are cutting, scraping and/or carving into the skin, and it is thought that between 70-90% of those who self-mutilate use these methods. Research by Rodham and Hawton (2009) has also suggested that 21-40% of those engaging in self-mutilation will bang and hit themselves, whilst 15-35% will burn themselves.

There are also differences noted in those who cut, those who burn and those who use both of these forms of self mutilation. According to Matsumoto, Yamaguchi, Chiba, Asami, Iseki & Hirayasu (2005) more male self-mutilators engage in burning as well as tattooing and piercing. Those who have experienced trauma, separation, abuse, and bullying tend to use more cutting as well as a combination of cutting and burning. These individuals also tended to have alcohol and other substance dependencies, as well as suicidal thoughts or a history of suicide attempts (Matsumoto et al., 2005). Research has also suggested that the best indicator of future self-mutilation is past self-mutilation (Guertin, Lloyd-Richardson, Spirito, Donaldson & Boergers, 2001; Hilt, Nock, Lloyd-Richardson, & Prinstein, 2008).

2.2.1 Self-mutilation and demographic characteristics

Self-mutilation generally begins in the adolescent years, but children from the age of 6 years in the United States of America who self-mutilate have been documented (Hicks & Hinck, 2008). A study by Resch et al. (2008) found that 2.9% of 11 to 17 year olds have attempted suicide or engage in self-mutilating behaviours, with 3.8% of those in that age group having suicidal thoughts. These children also reported having hyperactivity issues/problems, conduct problems, emotional problems as well as peer problems. Hilt et al. (2008) have indicated that 7.7% of pre-adolescents in North America have engaged in self-mutilation.

Similarly, in North America, 5% of college students sampled indicated that their self-mutilation began before the age of 10 years (Whitlock, Eckenrode, & Silverman, 2006), however generally self-mutilation begins between the ages of 12-16 years (Hawton, Harriss, Simkin, Bale & Bond, 2004; Klonsky et al., 2011, Muehlenkamp & Gutierrez, 2004; Whitlock et al., 2006). Research by Whitlock et al. (2006) has indicated that 17% of university students have self-mutilated in the past, and that these rates are similar in both males and females. Muehlenkamp and Gutierrez (2004) have found that between 13.9 and 21.4% of adolescents and young adults in North America, have self-mutilated. Research has also indicated that self-mutilation is higher in teenagers currently receiving psychiatric treatment (Klonsky et al., 2011) and that 10-15% of teenagers have self-mutilated at least once.

Briere and Gil (1998) have indicated that a lifetime rate of self-mutilation in the general adult population is 4% whilst the lifetime rate of self-mutilation in the in-patient adults is

as high as 21%. Self-mutilation is also more commonly seen in those reporting a homosexual or bisexual orientation (Whitlock & Knox, 2007).

Self-mutilation is not “limited to any race, gender, age, education level, sexual preference, religious beliefs or socioeconomic status” (Hicks & Hinck, 2009, p. 431). But it is however more common in white females in American studies between the ages of 14 and 24 years (Klonsky, 2007), who have a history of sexual abuse and who are single (Suyemoto, 1998). It is also more common in people who think about and consider suicide, as well as those who have previously attempted suicide. Sher and Stanley (2009) have indicated that between 55 and 85% of those who self-mutilate will have also attempted suicide.

According to Matsumoto et al. (2005) female self-mutilators most often use cutting whilst males more commonly use hitting or banging to self-mutilate. The general consensus amongst the various research studies into self-mutilation is that it is most common in the White population and in adolescents and young adults (Hicks & Hinck, 2008; Klonsky, 2007; Klonsky et al, 2011; Muehlenkamp & Gutierrez, 2004). Guertin et al. (2001) have indicated that those engaging in self-mutilation are mostly White females.

2.2.2 Self-mutilation and the prison population

According to Penn, Esposito, Schaeffer, Fritz and Spirito (2003) incarcerated individuals are at a greater risk for engaging in suicidal behaviour. Likewise, 30% of the incarcerated youths in their New England sample have a history of self-mutilation whilst incarcerated. Lohner and Konrad (2006) have indicated that self-mutilation and suicide

attempts are common problems in the prison population but that this behaviour may not necessarily represent actual suicidality but is rather used as a means of manipulation. Marzano, Hawton, Rivlin & Fazel (2011) have however indicated that self-mutilation and suicide in the prison population is not a means of manipulation but rather an indication of how emotionally vulnerable individuals are effected by the prison environment. These individuals, when placed in this particular environment, show increased risk for engaging in self-mutilation and suicide attempts. Their study demonstrated how female inmates in their sample had a previous history of childhood trauma which included sexual abuse, physical abuse, emotional abuse and neglect. Appelbaum, Savageau, Trestman, Metzner & Baillargeon (2011) have highlighted how self-mutilation and suicide attempts occur more frequently in maximum security and “lock down” prisons than in lower security prisons and that these self-mutilating inmates were more likely to suffer from a personality disorder than their non-self-mutilating counterparts.

Prisoners have also been noted to show an increase in self-mutilative behaviour to increase or decrease arousal (Nock & Cha, 2009). This self-mutilative behaviour is similarly seen in animals when placed in artificial environments (Nock & Cha, 2009).

2.3 THE TYPES OF SELF-MUTILATION

The most common form of self-mutilation seen in those engaging in this behaviour is that of cutting, but “other minor forms include burning, scratching, banging or hitting body parts and interfering with wound healing” (Klonsky, 2007, p. 227) are also noted. Other forms of self-mutilation include pulling out hair, breaking bones, inserting pins into the skin and extracting blood. There are more severe forms of self-mutilation and these usually leave the individual disabled or severely impaired. These severe forms of self-

mutilation are often seen in those suffering with schizophrenia or some other form of psychosis (Erdur, Turkcuer, & Herken, 2006). These severe forms of self-mutilation are usually rare and may include amputation of limbs and tongue, enucleation of the eyes and castration (Erdur et al., 2006).

Not only does self-mutilation vary with regards to its type and severity, but those who self-mutilate also have certain regions on their bodies which they prefer to mutilate. This is either because a certain region of the body is more easily hidden, and/ or the sensitivity of different body regions varies greatly with some being more sensitive than others. Self-mutilation of more sensitive regions may be preferred by the individual as the sensation of pain will be heightened. The regions often mutilated are the “wrists, arms, ankles, calves, inner thighs, belly, brassiere line, panty line, armpits and feet” (Hicks & Hinck, 2008, p. 410). It is interesting to note that the common regions mentioned are those easily hidden by clothing as well as those regions which are generally kept covered. Some individuals mutilate only one specific region, whilst others mutilate a variety of body regions over time, and this is specific to the individual as are most aspects of self-mutilation (Hicks & Hinck, 2008; Hicks & Hinck, 2009).

Self-mutilation can be subdivided into stereotypic, repetitive, major and episodic. According to Nock and Favazza (2009) stereotypic self-mutilation is defined as self-mutilation that is performed frequently, without the use of an implement and results in minor damage, such as scab picking. Klonsky et al. (2011) discusses repetitive self-mutilation, which is similar to Nock and Favazza’s (2009) stereotypic self-mutilation, in that the self-mutilation is performed frequently but it differs in that it may however, result in severe damage and may also involve the use of an implement, such as a blade used

for cutting. Major self-mutilation is performed less frequently but results in severe tissue damage achieved with an implement (such as a blade), for example castration. And finally, episodic self-mutilation is performed only a few times a year and the individual often doesn't even view themselves as being a self-mutilator (Klonsky et al., 2011). The severity of episodic self-mutilation is not defined by Klonsky et al. (2011).

Some lay people consider tattooing, body piercing and ritualistic scarring to be a form of self-mutilation. This is not the case as these are recognised as culturally acceptable practices and therefore cannot be considered to be self-mutilation (Hicks & Hinck, 2008) whereas self-mutilation is a cultural taboo (Suyemoto, 1998; Rissanen et al., 2008). Just as tattooing and piercing should not be confused with self mutilation, the same applies to masochism. According to the online medical journal (http://www.online-medical-dictionary.org/definitions-m/masochism.html) masochism is pleasure that is gained through both physical and/ or psychological abuse, and that this abuse may be inflicted by others or the self. Masochism may also refer to sexual masochism. Masochists and sexual masochists therefore gain "pleasure" through physically and psychologically inflicted pain whereas the self-mutilator gains "relief" through physical pain. According to Brown and Cunningham (1981) masochistic acts may serve a role in punishment. That is, the individual engages in masochism so as to punish themselves. This is similar to self-mutilation in that some self-mutilators use self-mutilation as a form of punishment.

2.4 MANNERS OF SELF-MUTILATION

Most individuals who self-mutilate "have a preferred instrument for the mutilation" (Hicks & Hinck, 2008, p. 410). Not only are different regions of the body preferentially targeted during the mutilation process but the instrument of self-mutilation also varies. These can

include scissors, knives, blades, razors, pins, and pieces of broken glass, pencil tips, paper clips and even the tabs off of cold drink cans. Finger nails, as well as fingers themselves, hard surfaces (upon which to bang or hit the body) can also be used to induce the damage and pain. As mentioned previously, some mutilate different regions of the body, and this also applies to the instruments used in that various instruments can be used to mutilate one or more regions of the body (Hicks & Hinck, 2008).

2.5 THEORETICAL SELF-MUTILATION MODELS

There are various models and disciplines which attempt to explain why self-mutilation occurs. These models will be discussed in the following section and consider self-mutilation from the psychological, biological and developmental perspectives. Some research has been conducted into animals and self-mutilation which suggests that there may be a biological link to self-mutilation.

2.5.1 Psychological models of self-mutilation

The functions of self-mutilation are many, and this is due to the fact that it serves different functions for different people in the context of their experiences, emotions and even in the context of the disorder from which they may suffer (Hicks & Hinck, 2009; Klonsky, 2007; 2009). Self-mutilation may be viewed as an emotionally defective response to life's shortfalls for some individuals, but it is however, highly effective on a physical level, even to the point where it may become addictive. This is attributable to the fact that the experience of pain causes the body to release endorphins which aid in pain management (Sher & Stanley, 2009). These endorphins are often addictive and may even produce feelings of euphoria as well as result in the release of tension. It is for these reasons that self-mutilation has the propensity to become highly addictive, and the

person will therefore need to self-mutilate more and more in order to gain the desired level of euphoria. This physical addiction and response to self-mutilation will be discussed in the biological model of self-mutilation at a later stage.

There are various models which attempt to explain the phenomenon of self-mutilation. These models attempt to explain the self-mutilating act to its ultimate function. The most popular model for understanding self mutilation is the *affect regulation model* (Klonsky, 2009). Other psychological models proposed by Klonsky (2009) include the *anti-dissociation model, the anti-suicide model, the interpersonal influence model, the sensation seeking model* and *the self-punishment model*. These models, even though proposed by Klonsky (2009) have been further developed by other researchers. Some of these models appear similar and overlap in certain regards; they are however, separate models.

2.5.1.1 The affect regulation model

This model states that self-mutilation serves a function in regulating affect (emotion) and that the act itself enables one to come to terms with the emotions that they are experiencing (Hicks & Hinck, 2008; Mikolajczak et al., 2009). It is therefore a way to "self-soothe"(Rissanen et al., 2008) and many self-mutilators have described the effect of injuring as being able to "release emotional pressure that builds up inside of me, to control how I am feeling, to get rid of intolerable emotions, to produce a pain that I can control" (Klonsky, 2009, p. 263). This "affect regulation" achieved via self-mutilation differs from person to person. Where some may self-mutilate to reduce the experience of negative emotions, others will self-mutilate in order to experience emotions (this is also considered in the anti-dissociation model).

The physical pain and scars express the emotions that the individual is unable to communicate themselves (Klayman Farber, 2008); for some it is a cry for help, a sign that something is wrong, and yet in the most contradictory fashion, the self-mutilator may hide their wounds and scars. They sometimes feel shame after the act and continue to injure themselves in secret (Hicks & Hinck, 2008), thereby not getting the help that they so desperately need. The self-mutilation and the scars thereof, are a form of communication when other communication is prohibited or difficult to express. Their pain is therefore physically etched into their skin (McLane, 1996), where the skin can be seen as a message board or stage upon which to enact their own "personal drama that reflects" the individuals psychopathology, life stresses as well as beliefs about themselves (Favazza, 2011, p. 41). The skin is an important barrier between the inner world (self) and outer world (environment), it is a container for everything that is "me" (Favazza, 2011).

The role of emotional intelligence has also been considered in the understanding of self-mutilation. Emotional Intelligence is the "individual differences in the extent to which people experience, attend to, identify, understand, regulate and utilize their emotions and those of others" (Mikolajczak et al., 2009, p. 182). It is said that those who are low in emotional intelligence are those that are most likely to use maladaptive strategies for coping with problems and have poor abilities to solve those problems. Self-mutilation is considered to be a physical manifestation of these maladaptive emotion coping strategies. They also have difficulty in "utilizing future orientated problem solving skills" and rely on more avoidant coping strategies (Andover, Pepper, & Gibb 2007, p. 238). These individuals therefore self-mutilate "because they have no other means of coping" (Andover et al., 2007, p. 238) and even though this method is maladaptive, it is effective.

Self-mutilation is often successful in affect regulation, its effects are often however short lived, and it is therefore not a solution to the problem. This is because those who self-mutilate are generally depressed and feel intensely hopeless, so the physical euphoria experienced is not sufficient to decrease the emotional pain for an extended period of time (Rissanen et al., 2008). Similarly, those who self-mutilate often have a particular cognitive style where they constantly ruminate on their problems, thereby increasing their depression and hopelessness which results in a further need to injure themselves (Moyer & Welch-Nelson, 2007). Regardless of this, self-mutilation is effective in the short term, where the individual feels “overwhelmed, sad, and frustrated before self-injury, and relieved and calm after self-injury” (Klonsky, 2009, p. 260).

2.5.1.2 The anti-dissociation model

Often those who self-mutilate will do so to eliminate feelings of dissociation or unreality. According to Tolmunen, Rissanen, Hintikka, Maaranen, Honkalampi, Kylma and Laukkanen (2008) dissociation may refer to dissociative disorders such as amnesia and dissociative identity disorder. Furthermore, dissociation may refer to a “lack of integration of consciousness” (Tolmunen et al., 2008, p. 768). The act of self-mutilation therefore allows the individual to reintegrate the consciousness and experience “reality” through pain and this may offer them a sense of being alive. The sight of the blood induced via injury is also an affirmation of life, and an ability to feel and experience. Dissociation is commonly seen in people who have experienced trauma, and in particular physical trauma and sexual abuse. Self-mutilation “can reorganise and stabilize the trauma victim’s world, providing a ‘voice on the skin’, when the actual voice is forbidden” (McLane, 1996, p. 107) and therefore allows the individual to eliminate their feelings of dissociation and cope with their experience(s). The physical pain experienced

as well as the control one has over that pain gives the individual a sense of “power and omnipotence” (Klayman Farber, 2008, p. 23), increasing the likelihood that further self-mutilation will occur. This is due to the individual now being in control of the amount of pain they experience and they can therefore decide how often and how hard they choose to inflict that pain.

2.5.1.3 The anti-suicide model

The anti-suicide model postulates that self-mutilation is a “coping mechanism for resisting urges to attempt suicide” (Klonsky, 2007, p. 229). It is a diversion, which allows the individual to cope and soothe, thereby allowing them to avoid committing suicide. Self-mutilation therefore “provides the possibility of new openness” (McLane, 1996, p. 117) and may also be a means to protect those individuals around the self-mutilator. This is because suicide always has a negative effect on the family and friends of the deceased; therefore self-mutilation relieves the need to end ones life, and will protect those around the self-mutilator. Many self-mutilators have attributed their behaviour to a desire to protect those closest to them (Moyer & Welch-Nelson, 2007) but in the end, self-mutilation will always have a negative effect on all those involved (Rissanen et al., 2008). The link between self-mutilation and how it can increase ones risk for suicide will be elaborated on at a later stage.

2.5.1.4 The interpersonal influence model

There are some self-mutilators who injure themselves with the view to control and manipulate those around them (Hicks & Hinck, 2008), for example by trying to incite anger in those around them (Hicks & Hinck, 2009). This is because those closest to the self-mutilator often put a lot of effort and time into helping them, so the self-mutilator is

able to control the situation as well as receive the attention that they desire. It should be noted, however that most self-mutilators hide their injuring behaviour so as to avoid gaining attention and their behaviour is therefore not intended to manipulate.

2.5.1.5 The sensation seeking model

According to the sensation seeking model, self-mutilation is a means “for generating excitement or exhilaration” (Klonsky, 2007, p. 230). It allows the individual to achieve the same sort of effect as those who engage in extreme sports, such as sky-diving. As mentioned previously, the endorphin release after the individual has injured themselves results in a feeling of exhilaration, and gives them a sense of power and control over the situation, themselves and the sensations achieved.

2.5.1.6 The self-punishment model

Finally, this model suggests that some self-mutilate so as to punish themselves. Many of these individuals experience feelings such as shame, hate and disgust, both of themselves and of their thoughts. The self-mutilation and pain experienced thereafter serves as a punishment for who they are as well as their thoughts and feelings. These “shameful” thoughts and feelings are often of an aggressive or sexual nature, and the individual therefore feels compelled to punish these thoughts, as they are unacceptable (to the individual). Moyer and Welch-Nelson (2007) have elaborated on Klonsky’s (2009) model by presenting how the act of self-mutilation is to punish for feelings of shame and guilt due to their thoughts, but the individual then experiences even more shame and guilt for the self-mutilating act itself, thereby resulting in a vicious cycle of continual self-punishment and guilt.

2.5.2 Biological models of self-mutilation

Endorphins are endogenous opioids which are released in response to injury and act as the body's natural pain killer (Basbaum, 2004). This release of endorphins into the body may result in a sense of euphoria within the individual and research has shown that this euphoric reaction is increased in some individuals more so than others (Sher & Stanley, 2009). It has been suggested that individuals who self-mutilate show reduced efficacy of their endogenous opioid system and that engaging in self-mutilation increases the release of endogenous opioids thereby normalising the level of endogenous opioids in the body (Sher & Stanley, 2009).

Research has also shown that those who self-mutilate have reduced pain sensitivity and that the explanation for this may be a lifetime of chronic stress and/ or trauma. This stress and/ or trauma can "alter or reset physiological levels of opioids and may create a deficiency state" (Sher & Stanley, 2009, p. 101). This suggests that stress and trauma may reduce the amount of endogenous opioids in the system or that chronic levels of stress resulting in the constant release of endogenous opioids may cause the individual to habituate to high levels of the opioids thereby reducing their efficacy. The developmental model agrees with this in that it states that childhood trauma may negatively impact the development of the individual (both psychologically and biologically) thereby increasing their risk for self-mutilation (Yates, 2009). Bohus, Limberger, Ebner, Glocker, Schwarz, Wernz & Lieb (2000) have indicated that between 70 and 80 % of those diagnosed with borderline personality disorder engage in self-mutilation and that these individuals have described how they do not feel pain whilst self-mutilating, thus indicating that the endogenous opioid system may be involved. The role of dissociation in this pain perception hasn't been considered in their research.

Other biological factors implicated in self-mutilative behaviour include serotonin, dopamine, dysfunctional hypothalamic pituitary adrenal axis (HPA) as well as genetics. Selective serotonin reuptake inhibitors (SSRI's) have proven successful in the treatment of self-mutilation. These SSRI's allow serotonin to act at the neurotransmitters for more extended periods of time thereby increasing the amount of serotonin available to the individual. Low serotonin levels are also implicated in depression, irritability and suicide attempts (Klonsky et al., 2011; Sher & Stanley, 2009).

Chronic stress can also impact the functioning of the HPA axis because of the constant release of cortisol. According to Sher and Stanley (2009) when an individual has high amounts of cortisol present in the blood stream, engaging in self-mutilation may help to return these cortisol levels to their baseline.

Therefore, childhood trauma/ stress and/ or genetic factors result in abnormalities in the endogenous opioid system, serotonin system, dopamine system and HPA axis. These abnormalities increase ones risk for elevated vulnerability to stress. When stress occurs, the opioid homeostasis is disrupted resulting in the individual engaging in self-mutilation. The self-mutilation allows for the restoration of homeostasis in the aforementioned systems (Sher & Stanley, 2009). Franklin, Hessel & Prinstein (2011) have also indicated that increased pain tolerance may also increase the risk of suicide thus indicating how pain tolerance plays a role in self-mutilating behaviour and risk for suicide. It has been suggested that this may occur because the individual is more capable of harming themselves on more severe levels as they experience pain at a reduced level to others (Franklin et al., 2011).

2.5.2.1 Animals and self-mutilation

Nock and Cha (2009, p. 70) have described why individuals may engage in self-mutilation and this is because it is seen as “natural, effective and readily available”. Self-mutilation is considered “natural” in that other animals engage in similar behaviours and it has been noted that the reason for this is to increase stimulation and to self-soothe. Self-mutilation is effective in that it works quickly and is easily available in that one only requires oneself in order to self-mutilate. Animals have been noted to also learn self-mutilation from other animals, and this is also seen in humans.

Self-mutilation is common in the Great Apes, Old World Monkeys, New World Monkeys and Prosimions. This link with self-mutilation and our evolutionary ancestors suggests a biological link to self-mutilation (Sher & Stanley, 2009). Self-mutilation is most commonly seen in animals that are placed in artificial environments and it serves as a device to either increase or decrease arousal (Favazza, 2011). McDonnell (2008) has indicated that horses engage in self-mutilative behaviour (biting limbs) and that the self-mutilation results in the release of endorphins (as seen in humans) and that these endorphins increase the likelihood of the self-mutilation occurring more frequently due to positive reinforcement. The reason behind self-mutilation in horses is unknown but it has been suggested that horses may self-mutilate due to boredom (reduced stimulation) and unsatisfactory living environments.

2.5.3 Developmental models of self-mutilation

As mentioned in the biological model, childhood trauma and stress may increase ones risk for engaging in self-mutilation. The developmental model agrees with this in that it states that childhood trauma may negatively impact the development of the individual

thereby increasing their risk for self-mutilation (Kaess, Parzer, Mattern, Plener, Bifulco, Resch & Brunner, 2013; Yates, 2009).

Kaess et al., (2013) have also highlighted how numerous studies have cited childhood sexual and physical abuse as a potential risk factor for the development of self-mutilative behaviour, but that these studies haven't considered how other adverse childhood experiences can influence self-mutilating behaviour. Their study has shown how various adverse childhood experiences are linked to certain forms of psychopathology, particularly dissociative disorders. In addition, their research has highlighted how childhood neglect and parental antipathy may also increase the likelihood of self-mutilative behaviour occurring.

Yates (2003) has indicated that childhood parental loss; major surgery, deprivation, chronic illness, emotional neglect and abuse (sexual and physical) can all serve as a risk factor for the development of self-mutilating behaviour. Yates (2003) suggests that the reason why adverse childhood occurrences may result in the onset of self-mutilation is due to the fact that the child learns to associate pain with nurturance. In addition, childhood abuse is strongly correlated with the development of dissociative disorders and post-traumatic stress disorder, and research has indicated that self-mutilation is especially prevalent in the presence of comorbid psychopathology such as those mentioned above. Self-mutilation and comorbid psychopathology will be considered in greater detail at a later stage.

2.5.4 Systems Theory and self-mutilation

According to Systems Theory the human organism functions as a system on its own, and that both internal and external factors surrounding the system will effect the integrity

of the system (Negative and Positive) (Stichweh, 2011). Stichweh (2011) considers Talcott Parsons' contribution to Systems Theory and describes Parsons' theory on how the system reacts to both internal and external stimulation. Stichweh (2011) formulated that the system is further divided into 1) *adaptive*- uses future orientation and external stimulation; 2) *goal attainment*- uses internal stimulation and future orientation; 3) *integration*- uses internal integration and present time orientation and finally, 4) *maintenance of long term patterns*- uses present time orientation and external reference. Systems Theory therefore demonstrates how the individual as a system uses both internal and external stimuli to maintain the integrity of the system. Self-mutilation may therefore be seen in terms of Systems Theory as a means to maintain the integrity of the system even though the means through which that integrity is maintained is potentially harmful to the individual.

2.6 COMORBID PSYCHOPATHOLOGY ASSOCIATED WITH SELF-MUTILATION

Self-mutilation often occurs in response to the individual's experiences, as well as their own responses to and thoughts of that experience. It is very common to note a history of sexual abuse, physical abuse and psychopathology in the self-mutilator (Cavanaugh, 2002; Resch et al., 2008; Yates, 2009). However, there are many other causes for why an individual may begin to self-mutilate, such as: substance abuse, family conflicts, major life changes and loneliness (Rissanen et al., 2008). In addition, self-mutilation can be learnt from self-mutilating peers (Moyer & Welch-Nelson, 2007).

With regards to those who have histories of physical and/or sexual abuse, self-mutilation may serve a function in managing past trauma (Hitchcock-Scott, 1999). Cavanaugh (2002) describes a case in which a rape survivor describes how she had cut the skin off

of her arms so that she could feel “clean”, because this was the part of her body the rapist held during the incident. The removal of the skin thus served a role in cleansing, and many similar cases have been reported of rape victims who have cut away or burnt off the skin linked to the rape (Cavanaugh, 2002).

It should also be noted that self-mutilation is “not related to general cognitive impairment” (Suyemoto, 1998, p. 532) but is rather (as mentioned previously) a maladaptive response and poor coping strategy. The reasons behind self mutilatory acts vary amongst individuals, their motivations as well as their underlying psychological wellbeing. Self-mutilators have reported a “range of conscious motivations including self-punishment, tension reduction, improvement in mood, and distraction from intolerable affects” (Oldham et al., 2005, p. 197). Their pain is therefore, externalized onto their bodies.

Previously, self-mutilation was only “associated with individuals who were diagnosed with schizophrenia, borderline personality disorder, or dissociative identity disorder” (Moyer & Welch-Nelson, 2007, p. 42). But we now see that self-mutilation can occur in the context of many other disorders and experiences, such as anxiety, depression and eating disorders (Moyer & Welch-Nelson, 2007; Oldham et al., 2005; Suyemoto, 1998).

The Diagnostic and Statistical Manual of Mental Disorders 5th edition of the American Psychiatric Association only specifically mentions self-mutilation within the context of borderline personality disorder and dissociative identity disorder (DSM-V, APA, 2013). Various research has, however indicated that self-mutilation can occur in a variety of other disorders as well as in individuals who do not meet the criteria for any disorder.

Self-mutilation is also seen in the context of non-diagnostic comorbidities such as physical, sexual and psychological abuse, suicidal thoughts and suicide attempts. The Diagnostic and Statistical Manual of Mental Disorders 5th edition lists self-mutilation under its final section of “other conditions that may be a focus of clinical attention” (DSM-V, APA, 2013) which demonstrates that self-mutilation needs to be considered in greater detail, especially in terms of diagnosis. The various forms of psychopathology and their link with self-mutilation will now be considered.

2.6.1 Borderline personality disorder

Borderline personality disorder is characterised by a pervasive pattern of instability. This pattern of instability extends to the individuals self-image, interpersonal relationships and emotions. Those with borderline personality disorder also show a pattern of impulsivity in their behaviour (DSM-V, APA, 2013). Other behaviours used to diagnose borderline personality disorder include avoiding thoughts of “abandonment”, interpersonal relationships which are unstable and/ or intense, unstable self-image, as well as unstable mood. Self-mutilation is common in borderline personality disorder and is listed as one of the potential criterion for the disorder (DSM-V, APA, 2013). The Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V, APA, 2013) refers to self-mutilation within the criterion for borderline personality disorder under criterion five which is “recurrent suicidal behaviour, gestures, or threats” and self-mutilative behaviour (DSM-V, APA, 2013, pg. 663). According to the DSM-V (APA, 2013) those with borderline personality disorder engage in self-mutilating and suicidal behaviour in order to address their feelings of ‘abandonment’. The self-mutilation also serves a role in reducing feelings of dissociation as well as serving as a means of self-punishment.

Burgess (1990), however, describes how the borderline personality population in his study attributed their self-mutilative behaviour to feelings of intense and overwhelming depression. Similarly, Franklin, Aaron, Arthur, Shorkey & Prinstein (2012) have described how emotion dysregulation is at the core of borderline personality disorder and that those who suffer from this disorder use self-mutilation as a means of regulating affect.

2.6.2 Depression

Depression is characterised by a depressed mood and loss of interest in activities that were previously pleasurable (DSM-V, APA, 2013). Depression is often associated with sleep and appetite disturbances and depression in seen in a variety of other comorbid disorders such as borderline personality disorder, bipolar related disorders and eating disorders. Depression is characterised by depressed mood, anhedonia, weight disturbances, fatigue, poor concentration, suicidal thoughts or thoughts about death. Those with depression are at a high risk for suicide and this is especially problematic in those with comorbid borderline personality disorder (DSM-V, APA, 2013). Self-mutilation may be used by those who are depressed to cope with the negative emotions they are experiencing and it therefore serves a role in affect regulation (Burgess, 1990).

2.6.3 Schizophrenia

Schizophrenia is a form of psychosis which is characterised by a variety of disturbances in terms of cognitions, behaviours and emotions. Those with schizophrenia may present with hallucinations and delusions, disorganised speech and behaviour as well as a blunting of affect (DSM-V, APA, 2013). Those with schizophrenia engaging in self-mutilation often experience hallucinations and delusions that may be religious in nature

(Erdur et al., 2006). A case study of a 27 year old man suffering with paranoid schizophrenia and auditory hallucinations was conducted in 2006 (Erdur et al., 2006). His auditory hallucinations instructed him to cut out his tongue, as well as to amputate his leg. When he was finally evaluated he had chemically burnt his skin, cut off his genitals and amputated a section of his tongue. He was also preparing to cut off his leg as instructed by his auditory hallucinations.

Another case study of a man with paranoid schizophrenia was conducted in 1995 (Yucel & Ozkan, 1995). He was 28 years old and also had auditory hallucinations from “God” which instructed him to remove both of his eyes. He thus removed both of his eyes using his index and middle fingers. He explained that this was so he would not be able to see the evil in the world anymore, as God had wished. Burgess (1990) has suggested that self-mutilation occurring during a psychotic episode may be attributed to psychotic decompensation.

2.6.4 Substance abuse/dependency

Gahr, Plener, Kolle, Freudenmann & Schonfeldt-Lecuona (2012) have shown how self-mutilation may be associated with the use of psychotropic substances. Of their sample 25 % had indicated that they had abused alcohol, another 25 % indicated that they had abused hallucinogens, whilst 22 % had indicated that they had abused amphetamines. Their study suggests that the cognitive impairment caused by the use of these substances increased the incidence of self-mutilation in their sample population.

Maloney, Degenhardt, Darke & Nelson (2010) considered the link between self-mutilation and opioid use. They suggested that previous research has shown a link

between opioid use and suicide and that 25 % of their opioid dependant population displayed self-mutilation. These individuals however, also showed a history of borderline personality disorder and childhood sexual abuse. Substance dependency is becoming more and more common in those who self-mutilate. Whether this is as a result of the self-mutilation, or the abuse of substances, is unknown. Both behaviours may however be indicative of a deeper problem. There is also a link between substance dependence, self-mutilation, suicide attempts, and sexual or physical abuse (Evren, & Evren, 2005). Between 29 and 34.6 % of those who self-mutilate are additionally dependant on a substance, particularly alcohol (Evren, Sar, Evren, & Dalbudak, 2008). The link between self-mutilation and substance abuse may be that both are indicative of an underlying form of psychopathology, both of which are being used to cope with the symptoms of that psychopathology.

Evren, Cinar, Evren & Celik (2012) have suggested that those who have a long term substance abuse problem are able to self-mutilate more easily because the substances they consume have allowed them to habituate to the physical sensations associated with self-mutilation and are therefore more capable of increasing the frequency and severity of their self-mutilation.

According to Sher and Stanley (2009), due to the release of endogenous opioids into the system after self-mutilation, as well as the euphoria experienced with the release of these opioids, self-mutilation has the potential to become addictive. Self-mutilation may therefore be considered as a form of substance dependency, in that the chemicals released during self-mutilation result in a ‘high’ and that the individual usually needs to

self-mutilate more and more in the future in order to gain the desired level of euphoria (Sher & Stanley, 2009).

2.6.5 Dissociative identity disorder

According to the DSM- V "Dissociative disorders are characterized by a disruption of and/or discontinuity in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behaviour" (APA, 2013, p. 291). Dissociative identity disorder (formerly known as multiple personality disorder) is characterized by the disruption of the individuals' identity due to the presence of two or more personalities. Those suffering from dissociative identity disorder may often experience 'black outs' and periods where they are unaware of where they have been. The DSM 5th edition (APA, 2013) states that self-mutilation and suicidal behaviour are common in individuals with dissociative identity disorder and that depression, anxiety and substance abuse are common comorbid disorders seen in the context of dissociative identity disorder. The self-mutilating behaviour seen in dissociative identity disorder may be performed by one of the other personalities ('alter') and not necessarily by the individual suffering from the disorder (West, 1999).

2.6.6 Bipolar related disorders

Bipolar related disorders are characterised by alternating periods of depression with periods of mania. The degree and cycling of the depression and mania is dependent on the type of bipolar related disorder from which the individual suffers (Bipolar 1, Bipolar 2 and Cyclothymic Disorder) (DSM-V, APA, 2013). Those suffering from one of the bipolar related disorder's are at a high risk of suicide due to the periods of depression and mania, as well as the impulsive behaviour associated with the bipolar disorders.

Comorbid anxiety disorders, substance abuse and disruptive disorders are commonly seen in those with bipolar (DSM-V, APA, 2013).

According to Joyce, Light, Rowe, Cloninger, & Kennedy (2010) self-mutilation is frequently seen in bipolar 1 disorder. They also found that bipolar disorder with comorbid borderline personality disorder increased the risk of self-mutilation and suicide in the individual.

2.6.7 Personality characteristics and self-mutilation

It has been suggested that certain personality factors can also increase ones risk for self-mutilation and that these personality factors are commonly associated with people who experience other forms of psychopathology. These personality factors include negative emotionality, difficulty managing emotions, self-deprecation, impulsivity as well as a tendency towards sensation seeking behaviour. These personality factors are commonly seen in people who have a history of suicidal thoughts, attempts, as well as in those who have completed suicide (Cooper, Kapur, Webb, Lawlor, Guthrie, Mackway-Jones, & Appleby, 2005; Evren & Evren, 2005; Hilt et al., 2008). Furthermore, negative emotions, poor affect regulation, impulsive behaviour and self-deprecation are personality characteristics commonly seen in those with borderline personality disorder and bipolar related disorders (DSM-V, APA, 2013).

2.7 SELF-MUTILATION AND ITS LINK TO SUICIDE

Research has indicated that self-mutilation and suicide are distinct concepts. However, it is important to note that self-mutilation is associated with suicidal behaviour and may even increase the risk for suicide (Klonsky et al., 2011; Cooper et al., 2005;

Meuhlenkamp & Gutierrez, 2004). The relationship between self-mutilation and suicide is complex and it has been noted that these two phenomena often co-occur and require further enquiry.

2.7.1 Suicide

According to the World Health Organisation (2012, in Wasserman, Rihmer, Rujescu, Sarchiapone, Sokolowski, Titelman, Zalsman, Zemishlany, & Carli, 2012) approximately one million people take their lives every year. Wasserman et al. (2012) have defined suicide as the acting out of self-injurious behaviour with death being the intended outcome. Suicide may also be defined as “a fatal act that represents the persons wish to die… [The word suicide] is derived from the Latin word for ‘self-murder’” (Sadock & Sadock, 2007, p. 897). Research has indicated that suicide is usually a process which progresses from suicidal ideation to developing a suicide plan and may eventually result in the acting out of that plan (Wasserman et al., 2012). Various research and theories distinguishes between thinking about suicide and acting it out. Suicidal ideation is when the individual seriously considers committing suicide and may even have suicidal intent (suicide plan) (Nock & Favazza, 2009; Tang, Yu, Wu, Du, Ma, Zhu, Zhang & Lui, 2011; Wasserman et al., 2012; Wenar & Kerig, 2010). Some individuals may have attempted suicide but failed. Suicide attempts are considered from the point of high lethality and low lethality. High lethality being methods which are likely to be more successful (firearm related) and low lethality methods being those which are less successful (toxicity of ingested substance related/overdose) (Skegg, 2005; Wenar & Kerig, 2010). Suicides also differ in terms of whether they were planned or unplanned. Planned suicides are usually associated with increased levels of depression, a sense of hopelessness, long term suicidal ideation and high lethality (Tang et al., 2011). Tang et al. (2011) have also

suggested that planned suicides are also more commonly associated with comorbid psychopathology whereas unplanned suicides are seen to follow a stressful life event.

According to Barlow and Durand (2009) and Wasserman et al. (2012) those who have a family history of suicide, low serotonin levels, existing psychological disorders, previous suicide attempts and stressful life events are at the greatest risk of attempting and completing suicide. Wenar and Kerig (2010) have suggested that females are most likely to attempt suicide whilst males are more likely to complete suicide. The reason for this is suggested that males and females have a tendency to choose certain methods of suicide over others, and that men tend to choose methods which are high in lethality and females prefer methods which are low in lethality (Kalat, 2007, Wenar & Kerig, 2010). The literature hasn't indicated whether males and/ or females are aware of the level of lethality of their chosen method of suicide and how this is implicated in suicidal intent. It has been suggested that males tend to use high lethality methods as they are more aggressive and that this coincides with the viewpoint that males are more aggressive than females (Kalat, 2007). According to Demirci, Dogan, Erkol, & Deniz (2009) the use of multiple methods of suicide is rare and that this is used by the individual to ensure that the suicide is successful. The use of multiple methods serves as a back-up plan should one method of the suicide fail.

Range, Leach, McIntyre, Posey-Deters, Marion, Kovac, Banos & Vigil (1999) have indicated that suicide is more common in America in male individuals and that Black males are more likely to use more violent lethal methods for suicide. Langhinrichsen-Rohling, Friend & Powell (2009) have suggested that the increase seen in suicides in Black individuals may be due to the lack of support and racism that they experience. It is

unclear why certain racial groups would choose certain methods of suicide over others, however, Chu, Goldblum, Floyd & Bongar (2010) and Langhinrichsen-Rohling et al. (2009) have suggested that certain cultural factors may play a role. According to their studies, cultural influences such as acceptability of suicide, cultural and religious beliefs, family support and collectivistic (community motivated) versus individualistic (individually motivated) behaviours may account for the differences noted in suicides of different races.

2.7.2 Suicide and self-mutilation

Individuals who self-mutilate have often reported that they have concurrent suicidal ideation and that some have even attempted suicide (Cooper et al., 2005; Guertin et al., 2001; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Whitlock & Knox, 2007). Engaging in self-mutilation allows the individual (if suicidal) to become more capable of attempting and or completing suicide, and it has been suggested that self-mutilation is on a continuum of self-harm and that suicide is the endpoint of that continuum (Klonsky et al., 2011; Harriss & Hawton, 2005; Meuhlenkamp & Gutierrez, 2007). Bergen, Hawton, Waters, Ness, Cooper, Steeg and Kapur (2012) have stated that “self-harm is the strongest predictor of future suicide especially when self-harm is repeated” (p. 526). Whitlock and Knox (2007) have also highlighted in their study on young adults in the United States that self-mutilation was strongly associated with suicidality and that as the frequency of self-mutilation increases so does the level of suicidal ideation.

Those who self-mutilate often show signs of other types of psychological distress which increases their risk for suicide (Skegg, 2005). These include depression, hopelessness,

negative self-image, impulsivity, anhedonia as well as a reduced ability towards future orientation (Cooper et al., 2005; Evren & Evren, 2005; Hilt et al., 2008; Klonsky et al., 2011). Moreover, those who self-mutilate have been shown to have other impulse control problems such as, eating disorders, substance abuse, physical violence and promiscuity problems/ issues (Sher & Stanley, 2009). These other factors also increase the risk for suicide.

Self-mutilation is a “marker for both increased suicidal thoughts and increased capability for acting on suicidal thoughts” (Klonsky et al., 2011, p. 22). Certain features of the individual’s self-mutilation may also increase their risk for suicide such as an extensive history of self-mutilation, multiple methods for self-mutilation, diminished pain experienced while engaging in self-mutilation as well as those who self-mutilate in isolation (as opposed to groups). Furthermore, self-mutilation increases ones risk for suicidal thoughts and behaviours because it allows the individual to habituate to the pain they inflict on themselves and therefore also reduces the fear of pain associated with death (Klonsky et al., 2011; Sher & Stanley, 2009). Those who self-mutilate and who have also attempted suicide show reduced fear of death and dying (Klonsky et al., 2011).

2.7.3 Suicide and self-mutilation in the South African context

According to the National Injury Mortality Surveillance System (NIMSS) (2011) the rate of suicide in male individuals is five times greater than that of female individuals in Gauteng. The age group which is most at risk for committing suicide in Gauteng is 20-39 year old individuals. NIMSS (2011) also indicated that hanging is the most common method of suicide (50.7 %), followed by toxicity of ingested substance related suicides

(25.1 %) and firearm related suicides (13.7 %). In addition, those in the 15 to 24 year age group are more likely to commit suicide by hanging (64.8 %) and those in the 30-34 year age group displayed a greater preference towards ingestion of toxic substances as their chosen method of suicide. Jump from height related cases were most commonly seen in those aged 25 to 29 years, whereas firearm related suicides were more commonly seen in older individuals between the ages of 35 to 39 years. Carbon monoxide related suicides were seen more commonly in those aged 30 to 34 years. NIMSS (2010) highlighted that Black individuals in Gauteng are more likely to commit suicide than White individuals. However Burrows and Laflamme (2006) have indicated that older White individuals in South Africa are at a greater risk for committing suicide whereas younger Black individuals are more likely to commit suicide.

Scribante, Blumenthal, Saayman & Roos (2004) found that suicides occurring in Pretoria, Gauteng, were more commonly seen in males (78 %). Males accounted for the majority in most methods of suicide, whereas females were seen to be using ingestion of toxic substances more commonly as their chosen method. On a cultural level, Scribante et al. (2004) found that Black males were more likely to choose hanging as their chosen method, whereas Black females used self-emolation. White males most commonly committed suicide with a firearm or carbon monoxide poisoning. Patterns seen in terms of chosen method of suicide and racial/cultural group are evident; the reasons for these differences appear to have gone unconsidered.

With regards to self-mutilation there are no reliable statistics on the prevalence of this phenomenon in the South African context. Research has also indicated that it is very difficult to establish the prevalence of self-mutilation in most countries because it is a

taboo in many cultures and those who injure themselves often keep it secret and pass unnoticed. Another reason why it is so difficult to assess the prevalence of self-mutilation is due to the lack of assessments which accurately measure self-mutilation. In addition, this lack of assessments is further impeded by the lack of consensus amongst researchers as to what the most accurate definition of self-mutilation is. This lack of agreement in terms of terminology has led to problems when attempting to compare results from various studies considering self-mutilation as well as how to interpret these results (Klonsky et al., 2011; Nock & Favazza, 2009).

According to Rodham and Hawton (2009) it is also difficult to establish accurate prevalence statistics because most research into self-mutilation focuses on clinical samples when a large portion of those who self-mutilate never reach the attention of clinicians. Hawton et al. (2004) have indicated that only 6.3 % of those who self-mutilate report to hospitals.

Since self-mutilation has become highlighted in the public eye, the numbers of those engaging in this behaviour appears to be increasing. It is uncertain whether this is due to those who self-mutilate reporting it because it is more accurately understood or whether mental health professionals are reporting it. It is also uncertain whether self-mutilation is being spread through the media?

2.8 SOCIAL INFLUENCES AND THE MEDIA

Research has suggested that self-mutilation may be learnt from self-mutilating peers. That is individuals who have no history of self-mutilation may learn that self-mutilation is an effective coping mechanism from peers (Briere & Gil, 1998; Guertin et al., 2001;

Peek, O'Brien, & Murrell, 2010). Research has also indicated that in treatment facilities it is common that one individual engaging in self-mutilation increased the likelihood of other previously non-self-mutilating individuals engaging in this behaviour (Briere & Gil, 1998; Guertin et al., 2001; Peek et al., 2010). This may suggest that self-mutilation may be 'contagious' in that once a person hears or sees someone else engaging in self-mutilation, this can inspire such a person to also engage in such behaviour. Peek et al. (2010) have suggested that in-patient self-mutilators may even go so far as to create groups of 'cutters' where the self-mutilation is used as a form of bonding and of competition. Individuals within these 'cutting' groups are in competition for being the "head cutter" and are attempting to demonstrate that their suffering is greater than others in the group by the amount of self-mutilation they inflict upon themselves (Peek et al., 2010). However, not all individuals who self-mutilate have learnt or observed it from their peer group, nor do all self-mutilators mutilate in order to demonstrate their unhappiness on a group level.

According to Whitlock, Purrington and Gershkovich (2009) the numbers of movies and songs involving self-mutilation have increased drastically in recent years. This trend has potentially harmful repercussions if we consider how some individuals learn to self-mutilate through social influences and the media. Between 1966 and 1970 there was one occurrence of self-mutilation in a movie, and none noted in songs. Between 2001 and 2005 these numbers have increased exponentially with 23 occurrences of self-mutilation in movies and 38 mentions of self-mutilation in songs (Whitlock et al., 2009). Regarding the characters engaging in self-mutilation in recent movies, 58.1 % of these were females between the ages of 12 to 30 years. These characters where all White

middle class individuals with an implied comorbid mental illness, and 61 % of the self-mutilation engaged by these characters was in the form of cutting.

It has also been noted that groups devoted to self-mutilation are widely spread on social network sites such as ‘youtube’ and ‘myspace’. These groups film and photograph their self-mutilation and share it on the internet (Klonsky et al., 2011; Whitlock et al., 2009). A study conducted by Lewis, Heath, Sornberger and Arbuthnott (2012) demonstrated how video’s of self-mutilation uploaded to youtube gain positive feedback from those watching these video’s. The concern with this is that by the individual ‘advertising’ their self-mutilation on social forums it creates an impression that self-mutilation is normal and acceptable within certain social spheres (Peek et al., 2010). These individuals share tips on how to self-mutilate and how to hide the self-mutilation so as to not get caught, as well as video’s regarding their life stories and why they began to self-mutilate. Youtube (2013) suggests on their website that these videos have been flagged as harmful and able to “trigger” self-mutilative behaviour and that they therefore prevent any under 18’s from being able to watch these videos. They claim to achieve this by making these videos accessible to only those who have a youtube account. The researcher was however, able to access these videos without being signed in which illustrates that anybody can view these videos and therefore be potentially negatively affected by them.

2.9 TREATMENT OF SELF-MUTILATION

It has been suggested that it is easier to help those who are in the early stages of self-mutilation compared to later stages; this is due to the fact that they are usually more open about their behaviour and more willing to accept help. It is however, unclear

whether this is referring to the treatment of the self-mutilating behaviour or treating the underlying cause of the behaviour. As time goes by it however, becomes increasingly difficult to assist those who self-mutilate on a regular basis (Hicks & Hinck, 2009). It also becomes increasingly difficult for the self-mutilators to seek out help themselves as they become increasingly dependant on and addicted to the sensation of their self induced pain. It is also very difficult to treat because little is known or understood about its course, assessment, aetiology and diagnosis (Hicks & Hinck, 2009).

Dialectical Behaviour Therapy (DBT) (usually used to treat borderline personality disorder) has proven to be somewhat effective in the early treatment of self-mutilation (Feigenbaum, 2008*)*. Dialectical Behavioural Therapy assumes that the individual may

> *"lack key interpersonal, self-regulation, and distress tolerance skills, and that personal and environmental factors may frequently block and/or inhibit the use of behavioural skills or reinforce maladaptive actions. DBT is based on an assumption of a pervasive skills deficit; thus the therapy is designed to facilitate the learning of new skills, the embedding of these skills into the individual's repertoire, and the generalization of these skills across contexts. DBT incorporates a range of change-enhancing strategies interwoven with acceptance-focused strategies" (Feigenbaum, 2008, p.112).*

However, there are many who regress back to their self-mutilating behaviour shortly after the treatment ends, and this may be due to the fact that the clinicians are treating the self-mutilating behaviour rather then the underlying cause for the behaviour.

Psychotherapy has also proven to be successful in the treatment of self-mutilation. The psychotherapies that have proven most effective are those that improve problem solving skills and emotion regulation (Hicks & Hinck, 2009). These treatments should “assess interpersonal functions of non-suicidal self-injury, and if present, address interpersonal skill deficits underlying these functions” (Klonsky et al., 2011, p. 50). Therapies that challenge the individual’s cognitive beliefs and distortions, such as cognitive behavioural therapy, and show them how these cognitions may increase their need to self-mutilate are also successful in its treatment.

Medications and exercise have also proven effective in the battle against self-mutilation (Klonsky et al., 2011; Nock & Favazza, 2009). These medications include selective serotonin reuptake inhibitors, dopamine agonists as well as endogenous opioid antagonists.

It has also been found that treating the source of the self-mutilation rather than the self-mutilation itself has been effective. Therefore treating the depression, anxiety, borderline personality disorder, or bipolar mood disorder first, will often reduce the individuals need to self-mutilate (Klonsky et al., 2011; Nock & Favazza, 2009).

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2.10 IMPORTANCE OF THE MEDICO-LEGAL AUTOPSY AND EXTERNAL PATTERNS OF INJURY

The following section will consider the importance of the medico-legal autopsy as well as the external patterns of injury most commonly seen in various methods of suicide. Understanding external patterns of injury is important in terms of the aims and objectives

of this study which will be further considered in Chapter 3, as these will highlight the differences noted between suicidal related injuries and self-mutilation related injuries.

2.10.1 Legal importance of the medico-legal autopsy

The National Health Act (Act No. 61 of 2003) makes provision for the existence of medico-legal mortuaries and its facilities as well as provision for the rendering of services by Forensic Pathologists and related medico-legal and laboratory services. The purpose of this service is to conduct a medico-legal investigation into the cause of death of an individual whereby the cause of death is unnatural or unknown. An unnatural death is one deemed to be related to:

a) Death as a result of physical influence (such as mechanical influence such as hanging) or chemical influence (such as purposeful ingestion of a toxic/ harmful substance). This influence may be direct or indirect.

b) Deaths which are usually considered to be of a natural cause, however, there is evidence to suggest that an act of omission or commission has occurred and that the death may be therefore, unnatural.

c) Deaths occurring under aneasthetic or deaths which follow aneasthetic related procedures and there is evidence to suggest that the death is as a result of the aneasthetic or procedure.

d) Deaths which are unexplained. That is, the cause of death is uncertain and there is no medical history to unequivocally explain the cause of death (National Health Act no 61 of 2003).

Therefore all unnatural or unknown causes of death need to be thoroughly investigated under the National Health act no 61 of 2003 so as to determine whether the cause of death was due to a criminal act, negligence, suicide or are accidental. This information provided by the medico-legal autopsy is necessary under the requirements of the Inquests Act (Act no 58 of 1959). The Inquests Act is necessary for the reporting of deaths which are deemed to be due to “other than natural causes” and the investigation into these unnatural deaths, the procedures to be followed in terms of unnatural deaths, the findings of the medico-legal autopsy and how all of this bears on the justice system in terms of unnatural deaths.

2.10.2 External patterns of injury associated with self-mutilation and suicide from a medico-legal perspective

A pattern of injury refers to both the type of injury or wound as well as the region of the injury or wound on the body of a deceased individual. The external patterns of injury seen in self-mutilation cases are most commonly sharp force injuries such as incised wounds. The external patterns of injury commonly seen in suicide cases include blunt force injuries such as lacerations and abrasions as well as sharp force injuries such as incisions. According to Shepherd (2003) sharp force injuries include stab wounds and incised wounds, whereas blunt force injuries include lacerations, abrasions, fractures, and contusions.

2.10.2.1 Incised wounds

Incisions are defined as a “cut or wound made by cutting with a sharp instrument” (Newman, Dorland’s Pocket Medical Dictionary, 1982, pp 352). There are three types of incised wounds and these are superficially incised wounds (slices) (Figure 1),

penetrating incised wounds (stab) and lacerating incised wounds (chop and puncture). The following figures (photographs) were all taken by the researcher during attendance of medico-legal autopsies.



Figure 1: Example of a superficially incised wound

2.10.2.2 Lacerations

Lacerations are caused by tearing, splitting or crushing soft tissue and is defined as a "torn, ragged, mangled wound" (Newman, Dorland's Pocket Medical Dictionary, 1982, p. 375). Lacerations are commonly seen over bony regions of the body and the wound is usually torn, irregular and contused. Penetrating laceration wounds (Figure 2 and 3) are commonly seen in firearm related cases (Shepherd, 2003).



Figure 2: Example of a penetrating laceration (entrance wound)



Figure 3: Example of penetrating laceration (exit wound)

2.10.2.3 Abrasions

According to Saukko and Knight (2003) there are four types of abrasions and these include, scratch abrasions, graze abrasions, friction abrasions and imprint abrasions. Friction abrasions are commonly seen in hanging cases in the form of a friction ligature abrasion (Figure 4).



Figure 1: Example of a friction ligature abrasion

2.10.2.4 Self-inflicted wounds

According to Shkrum and Ramsay (2007), most self-inflicted wounds tend to be incised wounds rather than stab wounds. The regions of the body wounded differ in homicide, suicide and accidental cases, with incised wounds to the upper extremities (especially the wrists and cubital fossa) being most common in suicide cases (Bouwer & Burger, 2006, Shkrum & Ramsay, 2007). In suicide cases, there can be wounding to both arms, the lower extremities, and stab wounds to the chest, abdomen, neck and face. Self-mutilation is commonly seen in some of the above mentioned regions as well including the arms, legs, feet, armpits, stomach and genital regions (Hicks & Hinck, 2008).

2.10.2.5 Scars

According to Saukko and Knight (2003) scars occur when previous injury has breached the epidermis of the skin. Some scars may be more noticable than others depending on the depth of the injury. Incised wounds may result in narrow scars, whereas burns and lacerations will result in more prominet scarring. Deep incised wounds if left untreated may result in more severe scars (Saukko & Knight, 2003). Ageing of scars cannot be accuratley assessed after 6 months. However if the scars are pink and soft it indicates that they are less then 2 months old. Brown/coppery scars are often between 2 and 6 Months old, and white, firm contracted scars are more then 6 months old (Mason & Purdue, 2000).

2.11 CONCLUSION OF LITERATURE REVIEW

Self-mutilation as a behaviour, as well as its link with suicide, has been considered in the literature review. It has been considered in terms of how an individual will self-mutilate, the preferred regions for self-mutilation, as well as comorbid psychopathologies seen in those engaging in self-mutilation.It has beeen shown that the statistics regarding self-mutilation are under-developed in the South African context and that it requires further attention. The literature review has also highlighted how research into self-mutilation within a suicide population hasn’t been considered and that self-mutilation may increase the risk for suicide.

Chapter 3: Methods and Procedures

The following chapter will consider the methods and procedures followed throughout the research process. This study was performed in various phases. Phase 1 included the initial aspect of data collection which was attending medico-legal autopsies as well as whether cases were either included or excluded in the sample. Phase 2 included collecting the final postmortem case files from the Johannesburg Forensic Pathology Service Medico-Legal Mortuary. The case files contain the final post-mortem report, the SAP 180 document, the Forensic Pathology Service death scene form and identification of the individual. Phase 3 included grouping the various data collected from each case into excel spreadsheets. And finally Phase 4 included the statistical calculations.

3.1 METHODS

The aim of this study was to determine the prevalence of self-mutilation in the suicide cases received at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary from July 2012 to February 2013.

The objectives of this study were to:

- Describe the prevalence of self-mutilation seen in the suicide cases at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary.
- Describe the demographics of the sample in terms of age, sex and population group.
- Describe the external of patterns of injury associated with self-mutilation.
- Describe the external of patterns of injury associated with method of suicide.
- Consider method of suicide chosen by those who show a history of self-mutilation as well as method of suicide in terms of the suicide population demographics.

This study was a prospective, exploratory and descriptive study which included both literature as well as the available data from medico-legal autopsy reports at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary between July 2012 and February 2013. This study was quantitative in nature in that it considered the cases of suicide received in terms of quantitative demographic data. The study also considered each case of self-mutilation from a case study perspective, thereby describing each case in as much detail as was available from post mortem observations, post mortem report as well as the SAP 180 document. The study was exploratory in nature in that it considered the topic of self-mutilation within a suicide population which has not been considered in previous research studies.

Data collection included cases of completed suicide to investigate whether these cases had evidence of self-mutilation (both old and recent self-mutilation). This allowed a comparison with the published international trends.

The inclusion criteria were:

- Cases of suicide received at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary between July 2012 and February 2013.
- Cases of suicide including adult individuals from 18 years of age and older.
- No mental health information was included in this study as the study aimed to establish a potential trend of self-mutilation in cases of completed suicide.

The exclusion criteria were:

- Cases where the cause of death was unascertained.
- Cases where the injuries noted on the body were unclear and could not be related to self-mutilation or suicide.
- Cases where reports were missing or incomplete.

3.2 PROCEDURES

In order to collect all suicide cases at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary from July 2012 to February 2013, the researcher was required to attend medico-legal autopsies. All suspected suicide (according to the history obtained from the SAP 180 document) cases where incorporated into this study according to the stipulated inclusion criteria.

3.2.1 Site of Study

This study was conducted at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary. The Forensic Pathology Service is made available by the Department of Health (DOH) and the South African Police Service (SAPS), its main activity being to carry out medico-legal death investigations, thus assisting in determining the cause of death in all unnatural death cases. The South African Police Service is directly involved with Medico-Legal Mortuaries in South Africa as the results from the post-mortem reports will allow the members of the South African Police Service to finalise cases as either suicidal, homicidal or accidental. The Johannesburg Forensic Pathology Service Medico-Legal Mortuary is based in Braamfontien. The catchment area for the Johannesburg Forensic Pathology Service Medico-Legal Mortuary is the greater Johannesburg area. The areas included coincide with the following police stations: Alexandra, Booysens, Bramley, Brixton, Cleveland, Douglasdale, Fairland, Hillbrow, Honeydew, Jeppe, Johannesburg Central, Langlaagte, Linden, Midrand, Mondeor, Norwood, Parkview, Randburg, Rosebank, Sandringham, Sandton, Sophiatown and Yeoville.

The Johannesburg Forensic Pathology Service Medico-Legal Mortuary is also involved in cause of death investigations received from the following clinics: Alexandra, Brenthurst, Carstenhof, Garden City, Linksfield, Morningside, Olivedale, Parklane, Rand, Rosebank and Sandton. Finally, the Johannesburg Forensic Pathology Service Medico-Legal Mortuary also investigates deaths received from the following hospitals: Charlotte Maxeke/ Johannesburg General Hospital, Coronation/ Raheema Moosa Mother and Child Hospital, Helen Joseph Hospital, Netcare Milpark Hospital, Netcare Mulbarton Hospital, Netcare Sunninghill Hospital, South Rand Hospital and Wits Donald Gordon Medical Centre.

3.2.2 Ethical Approval

Full unconditional ethics clearance was granted from the Wits Human Research Ethics Committee: Clearance certificate number: M110503 (See appendix 1). The researcher also obtained permission to attend post mortem procedures as well as gain access to the case files from the Mortuary manager of the Johannesburg Forensic Pathology Service Medico-legal Mortuary as well as the Head of the Division of Forensic Medicine and Pathology at the University of the Witwatersrand.

3.2.3 Data collection and analysis

All data was obtained by attending medico-legal autopsies of suspected suicide cases as well as obtaining the final medico-legal reports pertaining to these suspected suicide cases. Cases were determined to be as a result of suicide based on the history of the individual obtained in the SAP 180 form. This history may include eye witness accounts, suicide notes and sometimes evidence to suggest that the individual was showing signs

of suicidality prior to death. Various data relating to each suicide was collected on a data sheet.

The data sheet captured the demographics of each suicide case as well as other relevant criteria required for this study. In accordance with ethical clearance, no personal information pertaining to each case was recorded on the data sheet. The following is a list of the information collected from each case on the data sheet (see appendix 2 for data sheet).

- Age
- Sex
- Population group
- Method of suicide
- External of patterns of injury
- Presence of self-mutilation (if applicable)

Age was grouped according to the following categories: 18-28 years, 29-38 years, 39-48 years, 49-58 years, 59-68 years, and 69-78 years. The population group of each case was recorded as Black, White, Coloured or Indian. The category of Asian was not incorporated in the study as there were no individuals of East Asian decent (such as Chinese and Japanese) collected and it was felt that the category of Indian would better describe that particular aspect of the population group of the study. In South Africa the term ‘Indian’ is used as a group category for people who traditionally came from India, Pakistan, Bangladesh and the surrounding countries.

3.2.3.1 Phase 1-Attending post-mortem procedures

The researcher attended postmortem procedures from July 2012 to February 2013. The researcher would arrive at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary each day at 7:30. The researcher would then evaluate all cases for that day and determine based on the information provided by the South African Police Service in the SAP 180 document whether the case was a suspected suicide or not.

The SAP 180 contains the following information about each case:

- Name and Address of deceased
- South African Identity Number or Passport Number
- Ethnicity (White, Black, Coloured or Asian as listed in the SAP 180 document)
- Age of deceased
- Sex of deceased
- Particulars of Death
    1. Date and Time
    2. Place
    3. Motor Vehicle Accident (Driver, Passenger, Pedestrian, Cyclist, Motor Bike Accident)
    4. Suicide (Jump from Building, Hanging, Pills, Gassed, Firearm, Other)
    5. Other (Fall from Building, Firearm, Stabbed with Knife or Object, Poisoned)
    6. Died under Aneasthetic
    7. Sudden Death with no Medical History
    8. Died in Custody
- Full history

The researcher would prepare for each medico-legal autopsy by obtaining the necessary personal protective equipment (PPE). The personal protective equipment included a surgical gown, shoe covers, gumboots, two sets of protective gloves, scrub cap, hair net, safety goggles as well as a face mask which blocks out harmful pathogens. The researcher would wear all of this protective equipment to each medico-legal autopsy session. The researcher was also required to receive vaccinations for various diseases and illnesses which can be contracted by working within a medico-legal mortuary environment. These vaccinations included Hepatitis A and B, Tetanus, Meningitis, Polio, Diphtheria and Whooping Cough. The researcher would wait for the Forensic Pathologist to conduct the external examination of the body and then ask the Forensic Pathologist for permission to externally examine the body for evidence of possible self–mutilation. The regions examined by the researcher included the head, neck, anterior chest, posterior chest, anterior abdomen, posterior abdomen, anterior pelvis, posterior pelvis as well as the upper and lower extremities.

If self-mutilation was present, it was noted on the data sheet and photographs of the self-mutilation were also taken. The researcher would also point out any evidence of self-mutilation to the Forensic Pathologist so as to confirm its presence. The researcher would observe as the Forensic Pathologist and assistant dissectors performed the medico-legal autopsy of the individual and would make notes regarding the demographics of the individual as well as the external patterns of injury and presence of self-mutilation. It is important that the researcher consider the demographics of the individual in terms of the SAP 180 and the post-mortem report as the information regarding demographics listed on the SAP 180 is not always accurate. These inaccuracies are most commonly seen in terms of the age of the deceased. The researcher would also collect the age of the deceased from the information obtained off

of the deceased's South African Identity Document so as to ensure accuracy regarding age.

The external patterns of injury considered and seen during the medico-legal autopsies attended were consistent with the classifications of incised wounds, lacerations, abrasions, self-inflicted wounds and scarring.

3.2.3.2 Phase 2-Collection of case files related to included cases

Once the researcher had collected data pertaining to all suspected suicides during July 2012 to February 2013 the researcher then moved on to collecting each medico-legal autopsy case file for these cases. These case files are stored at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary and are completed by the Forensic Pathologist who conducted the medico-legal autopsy on that case. These case files contained information regarding the demographics of each case as well as method of suicide and external patterns of injury. This information was needed by the researcher in order to complete statistical analysis of these suicide cases, as well as to verify the types of injuries noted and method of suicide.

In January 2013 the researcher went to the case file office at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary to access the case files from 2012 and 2013. It was necessary for the researcher to allow some time to have elapsed between the actual medico-legal autopsy and the accessing of the case file relating to that case. This was necessary so as to have allowed the Forensic Pathologist adequate time to have completed the medico-legal autopsy report contained within the case file. The researcher went through the 2012 and 2013 filing cabinets and collected between one and twenty files a day (depending on availability). The researcher went through all

the case files to find the files applicable to this study and recorded the remainder of the information pertaining to each case on the data sheet. The researcher collected these case files between January and April 2013. The researcher was not allowed access to the case file office on Tuesdays, as Tuesdays are the days that members of the South African Police Service come to the Johannesburg Forensic Pathology Service Medico-Legal Mortuary to collect the post-mortem reports related to the cases they are investigating.

The medico-legal autopsy report in each case file recorded the following information:

- Death register number
- Doctor/ Forensic Pathologist's name
- Demographic information of the deceased
- Date of post-mortem
- Chief post-mortem findings
- External appearance of the body
- Height and weight of deceased
- Clothing and identifying features
- Head and neck
- Chest
- Abdomen
- Spine
- Specimens retained
- Additional observations

3.2.3.3 Phase 3-Capturing of data

Once all the case files had been obtained for each case and recorded onto the researcher's data collection sheets, the researcher then transferred all this information into excel spreadsheets (see appendix 3) so as to conduct statistical analysis on the cases included in the study. The excel spreadsheets contained the following information:

- Body number of the individual
- Sex
- Age range
- Actual age
- Population group
- Method of suicide
- External regions of injury and/ or self-mutilation (head, neck, anterior chest, posterior chest, anterior abdomen, posterior abdomen, anterior pelvis, posterior pelvis, upper extremities and lower extremities)
- Presence of self-mutilation
- Types of Injury (abrasions, lacerations, perforating wounds, and incised wounds)
- Self-mutilation related injuries (scarring, unhealed cutting, single self-mutilation, multiple self-mutilation)

Various spreadsheets were made for each method of suicide, namely hanging, toxicity of ingested substance related suicide, firearm related suicide, carbon monoxide related suicides, multiple methods of suicide and jump from height related suicides. A separate spreadsheet for all the cases of self-mutilation was also created. The information in these spreadsheets was grouped in ways to make statistical analysis accurate and more

efficient. The spreadsheets listed information pertaining to each case. This information was age, age group, gender, population group, method of suicide, external regions of injury, types of injuries sustained on external regions and self-mutilation related injuries and / or scars. The data was listed numerically, that is 1=yes/present, 0=no/not present, so as to improve the efficacy of the statistical analysis.

3.2.3.4 Phase 4- Statistical analysis

Once the researcher had grouped all the data for statistical analysis into the excel spreadsheets the data was ready for statistical analysis. The researcher's statistical analysis was conducted with the assistance of Mr. Glory Atiolla at the University of the Witwatersrand Postgraduate Hub located in the University of the Witwatersrand Medical School. This statistical service is made available to post-graduate students by the University of the Witwatersrand.

The statistical analysis was done on the statistics program Stata Version 12. The data from the researcher's excel spreadsheets were imported into the Stata program and various commands were given to the program based on the objectives of the study. The Stata program determined the prevalence of self-mutilation in the suicide sample by calculating the frequency and percentage of self-mutilation. Chi^2 tests were also performed on the data obtained from the self-mutilation cases so as to determine the statistical significance of self-mutilation in the sample as well as the specific aspects of self-mutilation such as scarring vs. unhealed cutting within the different demographics. When using a Chi^2 test, a p-value of less than 0.05 is considered to be of statistical significance (Lucy, 2005). The program then calculated the frequencies and percentages of the various demographics so as to describe these demographics. The same was conducted for the external patterns of injury associated with method of

suicide and self-mutilation so as to adequately describe these methods of suicide and external patterns of injury. The researcher also calculated the mean, variance and standard deviation of the sample population's age.

The statistical program Stata Version 12 was used to create frequencies and percentages regarding the demographics, method of suicide and external patterns of injury of each case. Chi^2 analysis was also used in terms of self-mutilation so as to determine the statistical significance. Bar and pie graphs were then created based on the frequencies and percentages obtained from the Stata program so as to visually describe the demographics, method of suicide, external patterns of injury as well as the self-mutilation seen in the population.

3.3 CONCLUSION OF METHODS AND PROCEDURES

This chapter has considered and highlighted the methods and procedures followed throughout the process of conducting this research. The results from this research will now be considered in the following chapter.

Chapter 4: Results

In this chapter the raw results of the processed data will be presented. The data in terms of demographics, method of suicide and external patterns of injury will be considered for the suicide population as well as the self-mutilation sample. Case study discussions will also be given regarding the self-mutilation sample.

4.1 INTRODUCTION

A total of 145 suicides were analysed between July 2012 and February 2013 at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary. This is the total number of suicide cases received by the Johannesburg Forensic Pathology Service Medico-Legal Mortuary during this period. The method of suicide noted in these 145 cases included hangings, toxicity of ingested substance related suicides, carbon monoxide related substances, multiple methods of suicide (such as hanging and ingestion of a toxic substance used in conjunction), firearm related suicides and jump from height related suicides. Eleven out of the 145 cases of suicide (8%) displayed a history of self-mutilation in the form of scarring and/ or unhealed cutting. Frequencies and percentages were created for the suicide population as a whole as well as for each method of suicide. Chi^2 analysis was also considered in terms of self-mutilation and whether the self-mutilation variables were statistically significant. Detailed results regarding the demographics of the population (suicide and self-mutilation) as well as their external patterns of injury will follow.

4.2 DEMOGRAPHICS OF THE SUICIDE POPULATION

The basic demographics of the individuals included into the overall suicide sample were considered. These demographics included, age, sex and population group.

4.2.1 Age in suicide population

The mean age of the overall suicide population was 37 years, with a standard deviation of 13 and a variance of 173. The mean, standard deviation and variance were considered for each method of suicide and will be discussed. The following table (Table 1) demonstrates the mean age of the population as well as the standard deviation and variance.

Table 1: Mean age of the suicide sample

	Mean age (years)	Standard Deviation (years)	Variance
All methods	37	13	173
Hanging	35	13	177
Toxicity of ingested substance related suicide	38	13	169
Firearm related suicide	44	14	212
Carbon monoxide related suicide	34	17	301
Multiple methods	38	15	227
Jump from height related suicide	33	9	84

Those individuals with the highest mean age were those in which the chosen method of suicide was firearm related. The mean age for the firearm related suicides cases was 44 years with a standard deviation of 14 and a variance of 212. Those with the lowest

mean age where those whose chosen method of suicide was a jump from height related suicide. This category had a mean age of 33 years, with a standard deviation of 9 and a variance of 84.

In the overall suicide population, 35% (51/145) were between the ages of 18 and 28 years old; 25% (36/145) were between 29 and 38 years old; 17% (25/145) were between 39 and 48 years old; another 17% (24/145) were between 49 and 58 years old; 5% (8/145) were between 59 and 68 years old and 1% (1/145) of the overall suicide population was between 69 and 78 years old. These percentages are considered in Figure 5.

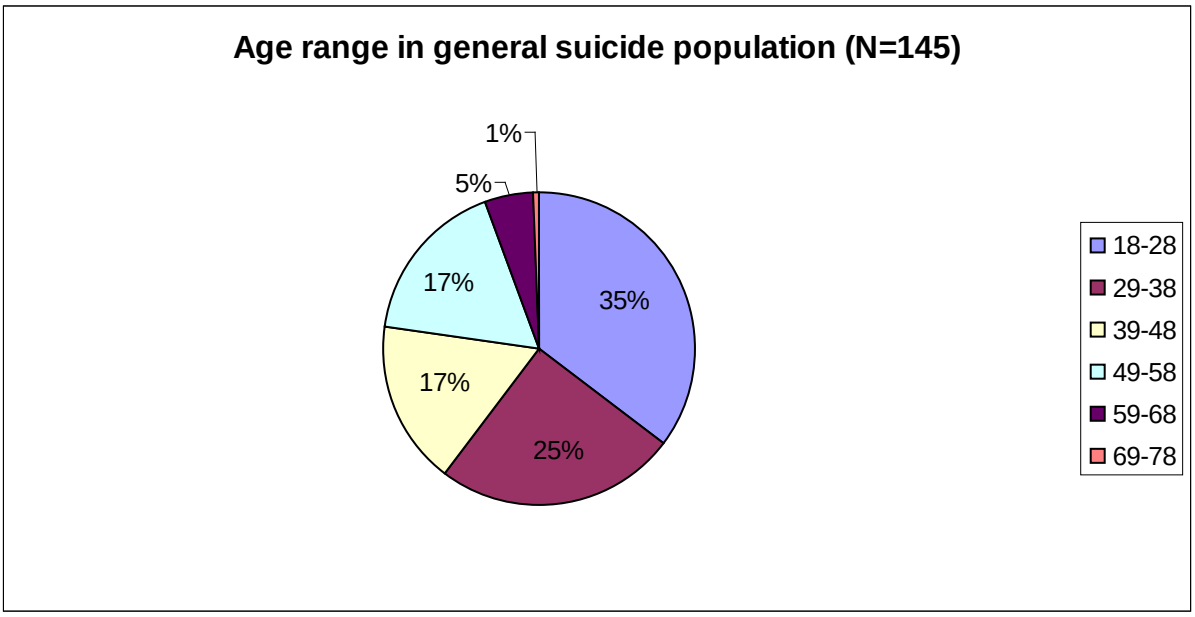

Figure 5: Age range in general suicide population (N=145)

In terms of age and the method of suicide, 36% of hangings were between the ages of 18 and 28 (23/64). The next most common age ranges noted in hangings were seen in the 29 to 38 year age range (28%, 18/64) and the 39 to 48 year age range (22%, 14/64). Smaller percentages were seen in the older age ranges in the hanging population with

8% (5/64) being between the ages of 49 and 58 years, 5% (3/64) being aged between 59 and 68 years and finally 2% (1/64) were seen in the oldest age range of 69 to 78 years. See figure 6 to follow.

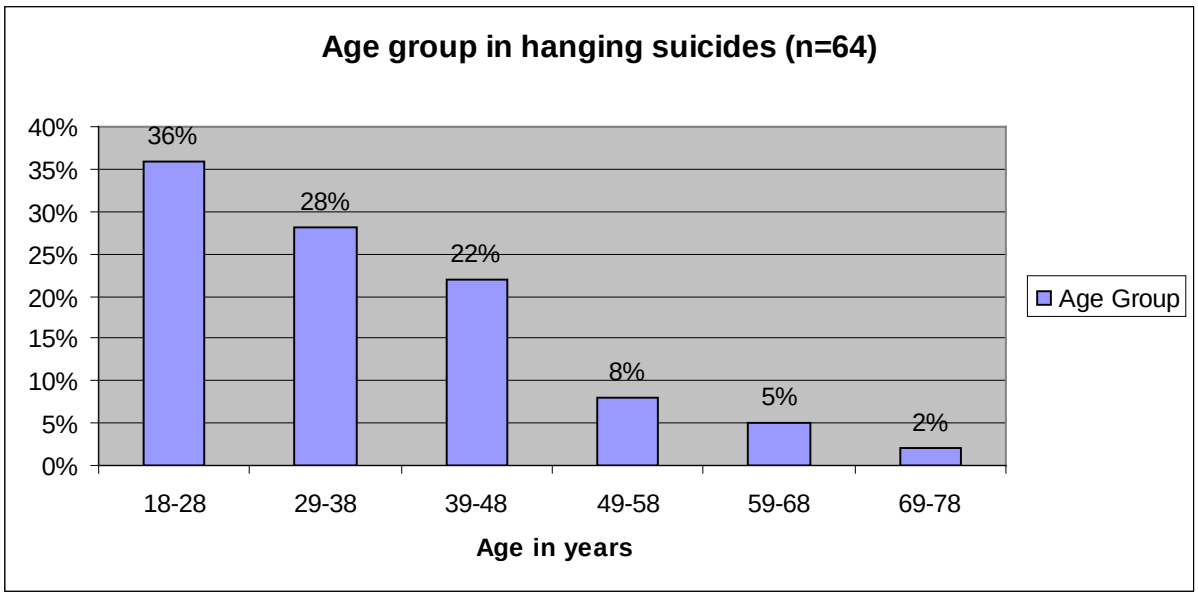

Figure 6: Age group in hanging suicides (n=64)

Toxicity of ingested substance related suicides that were in the 18 to 28 year age group comprised 35% (14/40) of the sample. Those aged between 29 to 38 years and 49 to 58 years shared the same percentage of the toxicity of ingested substance related suicide sample (23%, 9/40), whereas those aged between 39 and 48 years old where represented in 12% (5/40) of the toxicity of ingested substance related suicide sample. However, the smallest percentage in terms of age range and toxicity of ingested substance related suicides were only seen in 7% (3/40) of those aged between 59 and 68 years. Age range in terms of toxicity of ingested substance related suicides will be considered in the following figure 7.

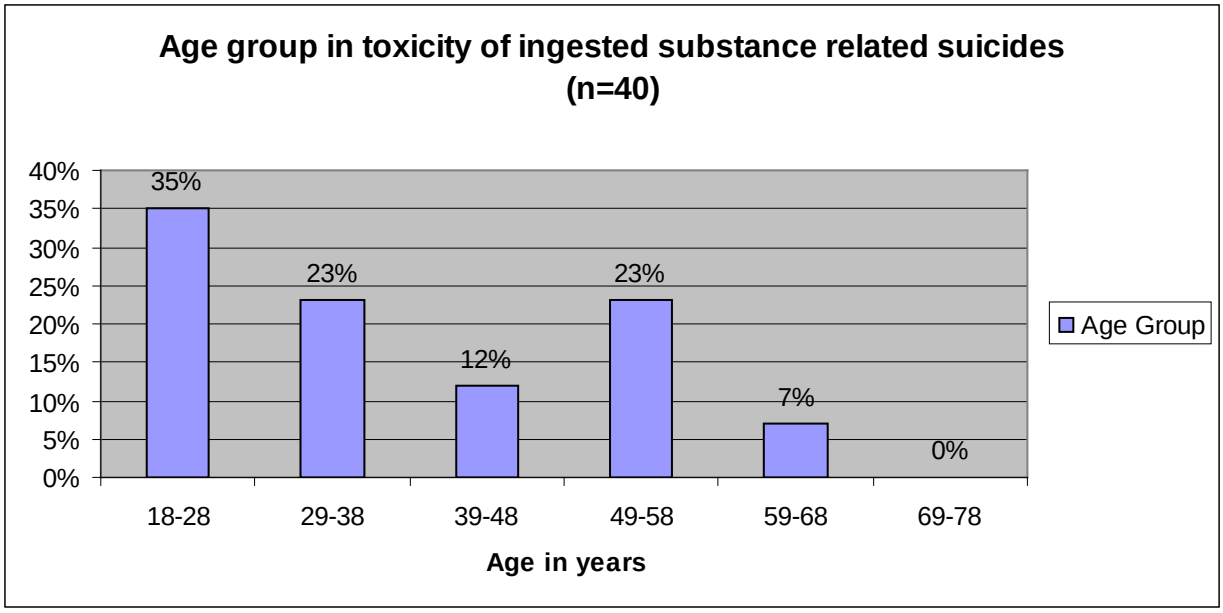

Figure 7: Age group in toxicity of ingested substance related suicides (n=40)

In the carbon monoxide related suicide cases, the majority of the sample was in the youngest age group of 18-28 years (60%, 3/5). The other 40% of the sample was seen in the 29 to 38 age group (20%, 1/5) and the 59 to 68 age group (20%, 1/5). See figure 8 to follow.

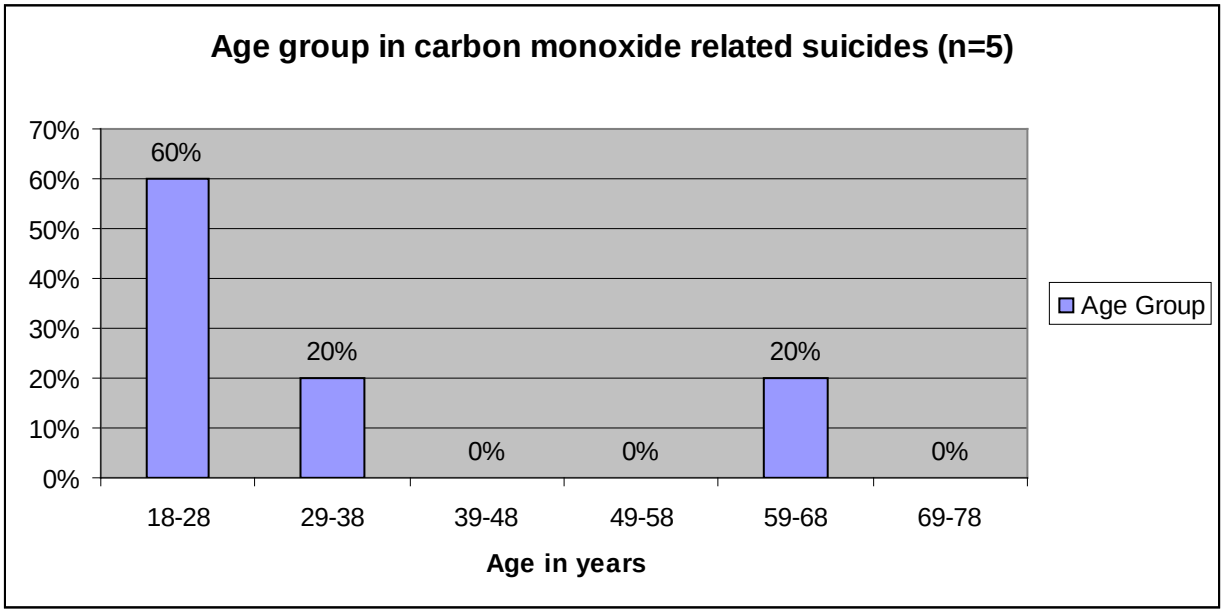

Figure 8: Age group in carbon monoxide related suicides (n=5)

In the multiple methods of suicide category it was seen that the 18 to 28 age group and the 39 to 48 age group shared equal values of 33.33% (3/9). Another 22.22% (2/9) of the multiple method of suicide sample was present in the 49 to 58 age group and finally, 11.11% (1/9) of the sample fell into the 29 to 38 age group. These values are visually represented in Figure 9 to follow. The multiple methods of suicide seen in this portion of the population included, hanging/ingestion of toxic substance, ingestion of toxic substance/asphyxia, hanging/asphyxia, pedestrian vehicle accident/ jump from height and stabbing/slitting of throat.

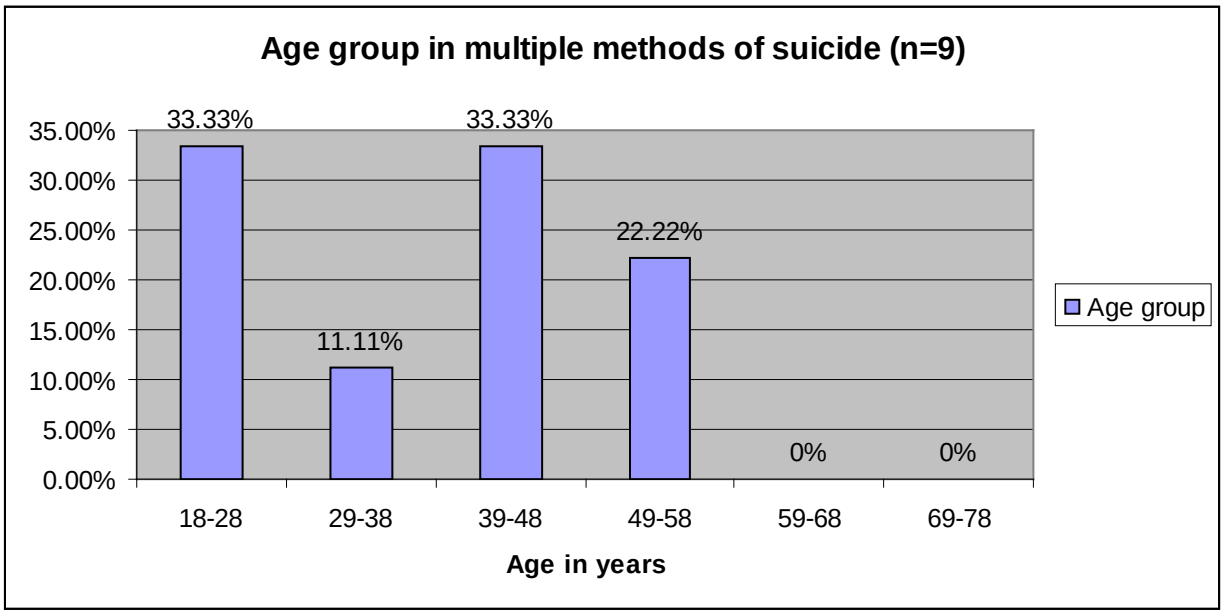

Figure 9: Age group in multiple methods of suicide (n=9)

In terms of firearm related suicides (figure 10), 20% (3/15) were between the ages of 18 to 28 years old, and 13% (4/15) were between the ages of 29 to 38 years old and 39 to 48 years old. The highest percentage in terms of age and firearm related suicide was seen in those between the ages of 49 to 58 years old (47%, 7/15). And finally, 7% (1/15) of the firearm related suicides were aged between 59 to 68 years.

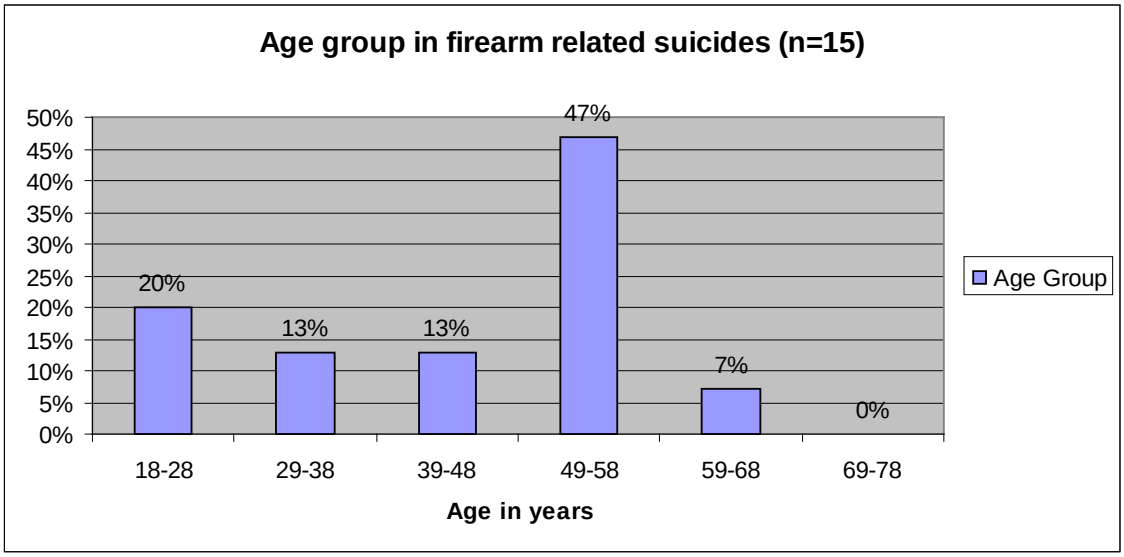

Figure 10: Age group in firearm related suicides (n=15)

Finally, those whose chosen method of suicide was jump from height had 42% (5/12) in the 18 to 28 age range and 42% (5/12) in the 29 to 38 age range. And those in the 39 to 48 age range and 49 to 58 age range each comprised 8% (2/12) of the jump from height suicides. See figure 11 to follow.

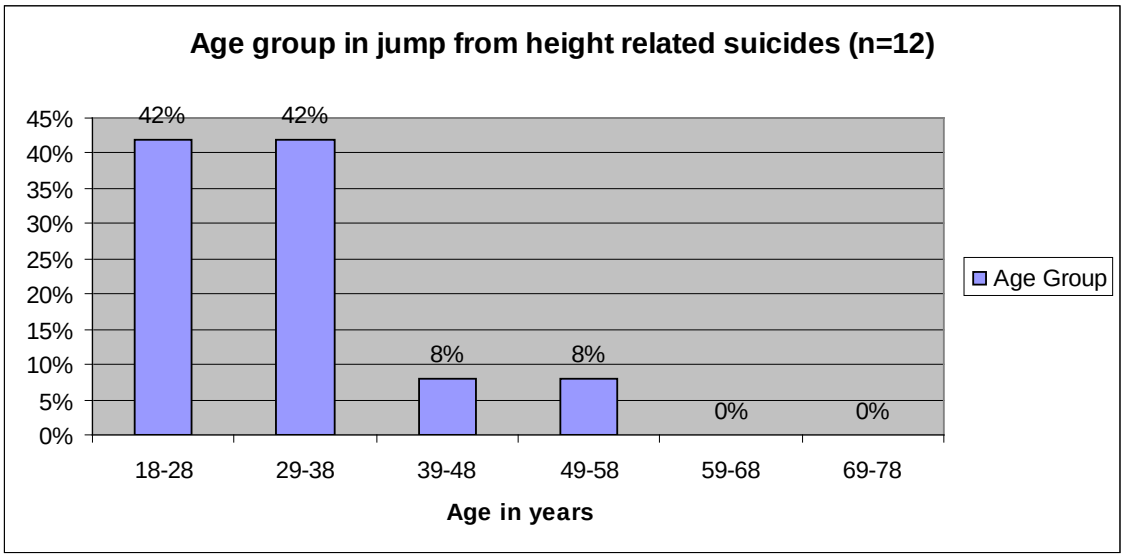

Figure 11: Age group in jump from height related suicides (n=12)

4.2.2 Sex in suicide population

Of the 145 suicides collected for this research, 110 (76%) were male and 35 (24%) were female (Figure 12). Most of the sample was therefore male and this pattern is noted throughout each method of suicide.

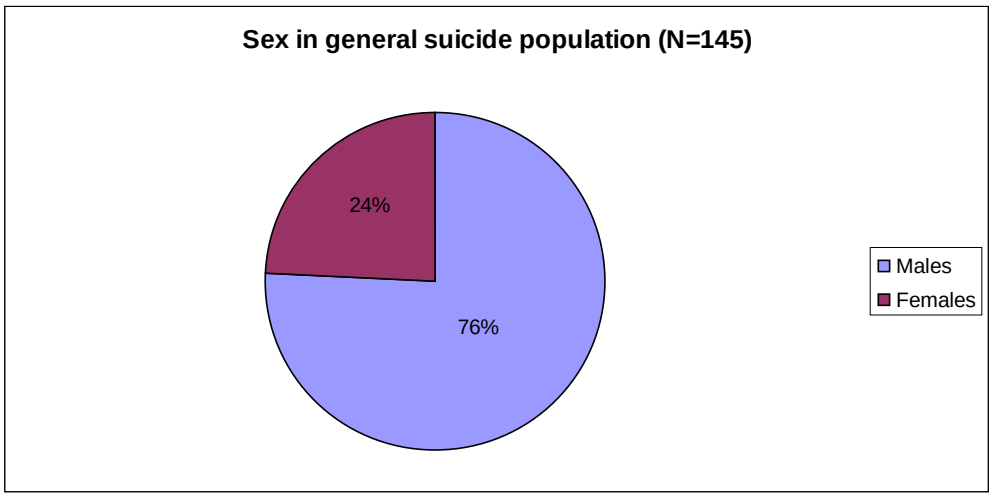

Figure 12: Sex in general suicide population (N=145)

In terms of sex and method of suicide, 88% (56/64) of those whose chosen method of suicide was hanging were male individuals and only 13% (8/64) of hanging cases were attributed to females (Figure 13).

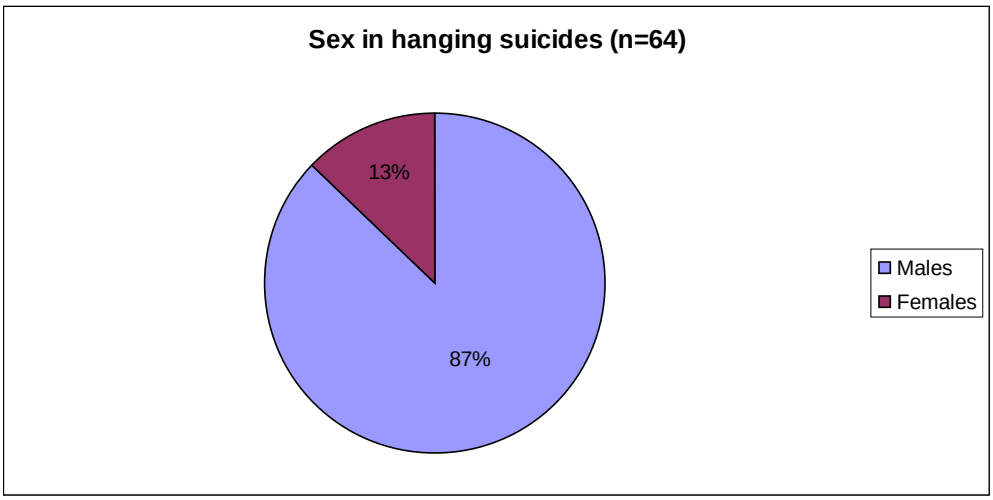

Figure 13: Sex in hanging suicides (n=64)

In the toxicity of ingested substance related suicide sample, 53% (21/40) of these were males, whereas 47% (19/40) of females had ingested a toxic substance as their chosen method of suicide (Figure 14).

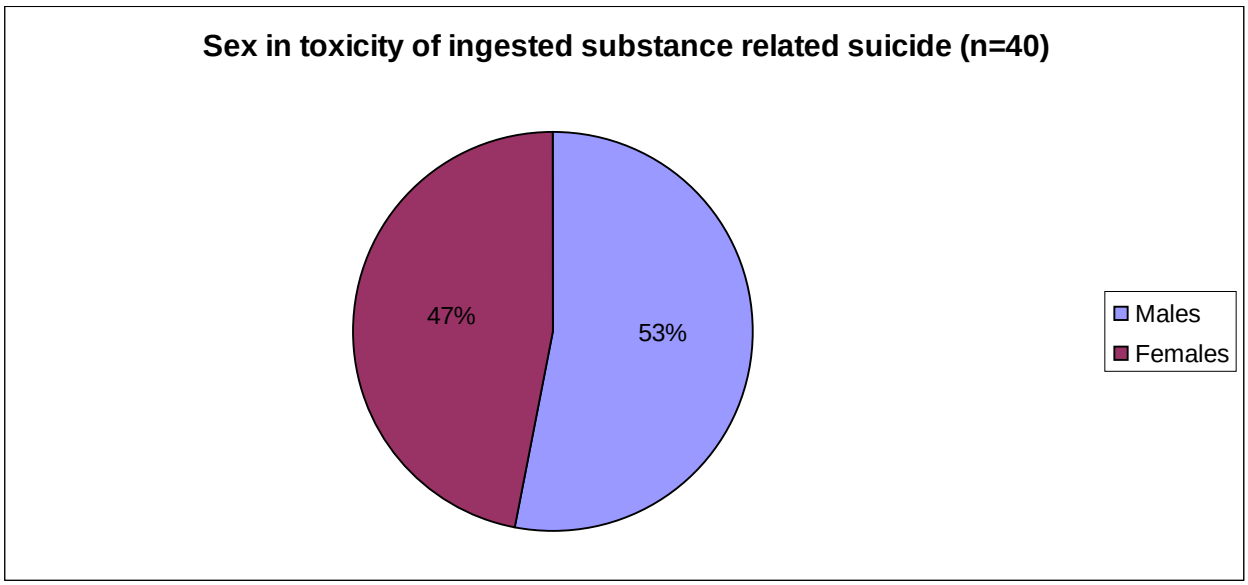

Figure 14: Sex in toxicity of ingested substance related suicide (n=40)

All the carbon monoxide related suicide cases in the sample where male. There were no females in this portion of the sample and therefore no visual graphs were created to highlight this.

As is seen in the other methods of suicide and sex the number of males using a multiple method of suicide as their chosen method was also very high (89%) (8/9) whereas only 11% (1/9) of females used multiple methods as their chosen method of suicide (Figure 15).

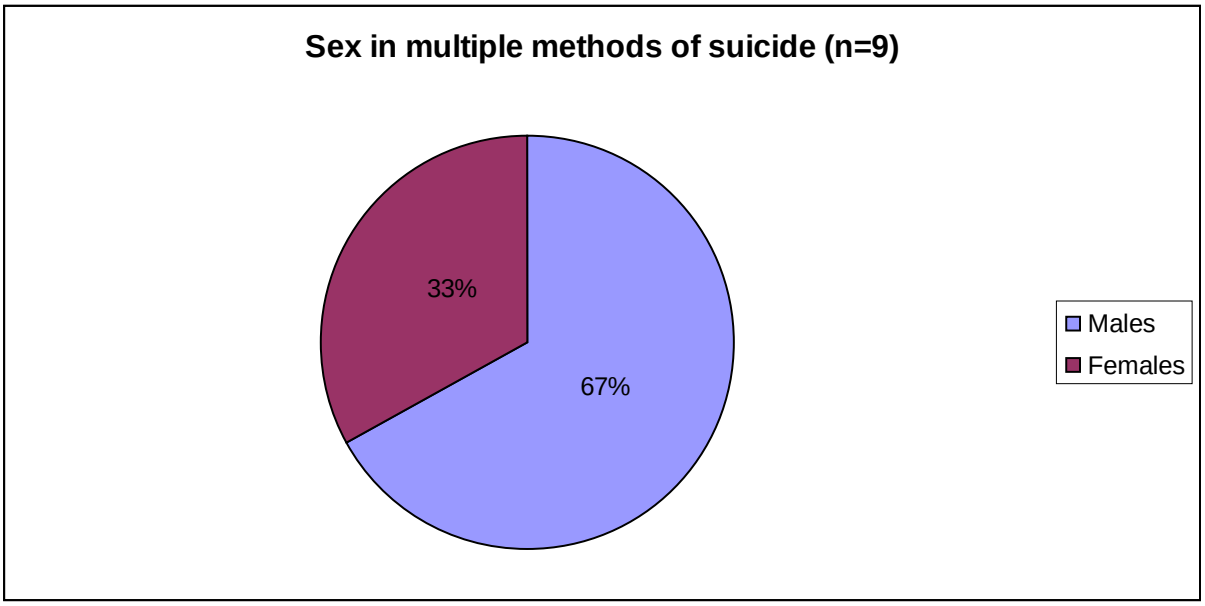

Figure 15: Sex in multiple methods of suicide (n=9)

Firearm related suicides were also noted to be mostly male (67%) (10/15) whereas half that (33%) (5/15) were female (Figure 16).

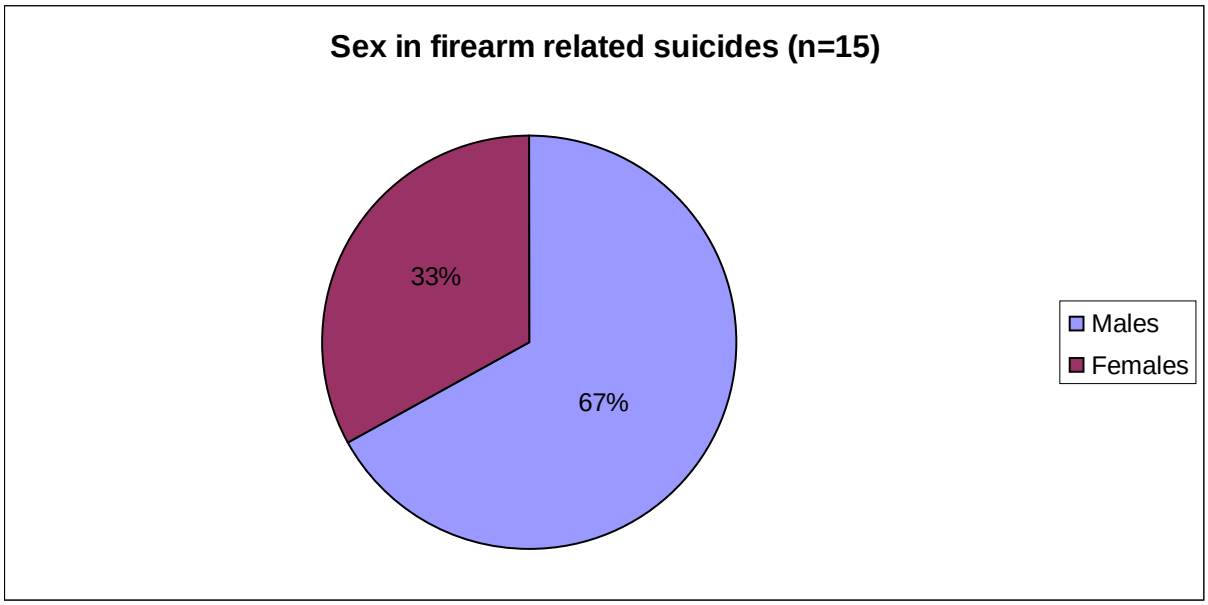

Figure 16: Sex in firearm related suicides (n=15)

Finally, 83% (10/12) of jump from height related suicides were male and 17% (2/12) were female (Figure 17).

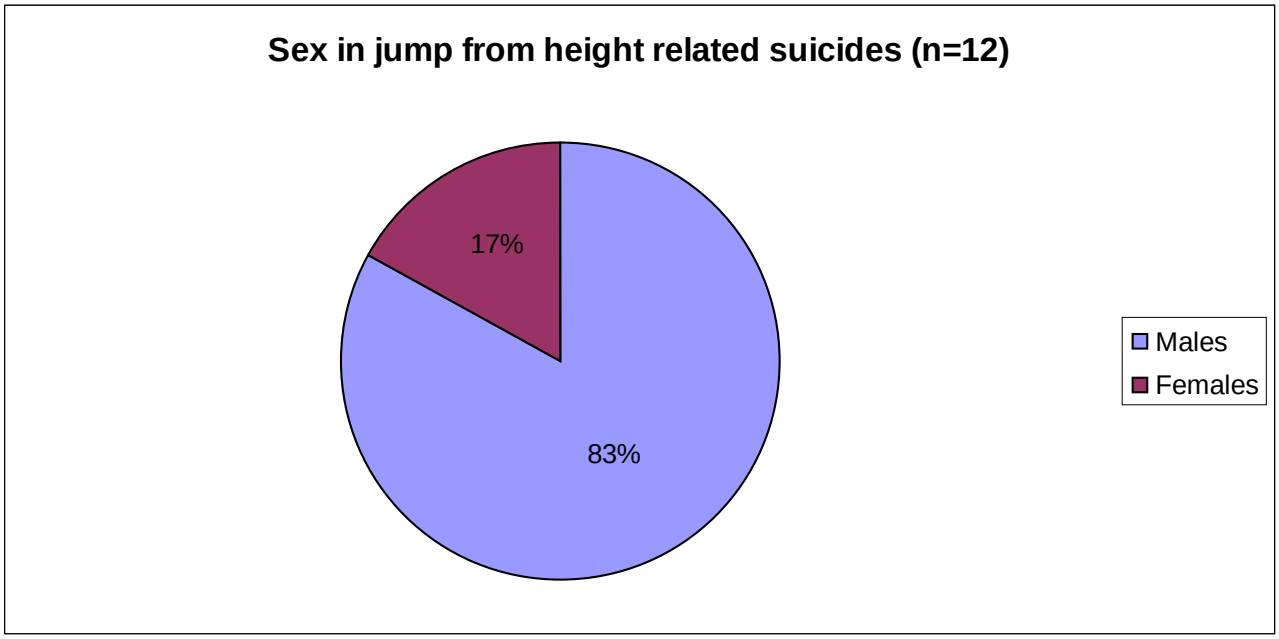

Figure 17: Sex in jump from height related suicides (n=12)

4.2.3 Population group in the entire suicide population

Of the 145 suicide cases analysed for this research, 70 of the deceased individuals were Black individuals, 54 were White individuals, 11 were Coloured individuals and 10 were Indian individuals. The data collection sheets used to record data from each suicide originally classed individuals as Black, White, Coloured and Asian however it was established that individuals who were represented in the sample were of Indian decent, and not Asian decent. Certain population groupings were more common in certain methods of suicide (Figure 18).

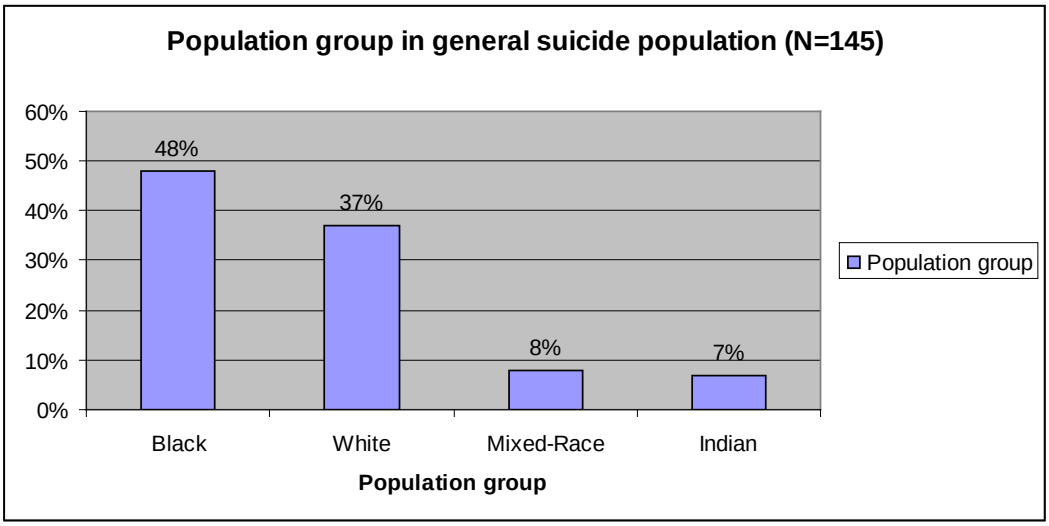

Figure 18: Population group in general suicide population (n=145)

4.2.3.1 Population group and hanging as a method of suicide

Of those individuals who used hanging as their chosen method suicide, 38 of the 64 deceased individuals were Black individuals (59 %). Of the other population groups, 14 White individuals (22%) used hanging as their method of suicide, with 5 Coloured individuals (8%) and 7 Indian individuals being included (11%), see Figure 19 below.

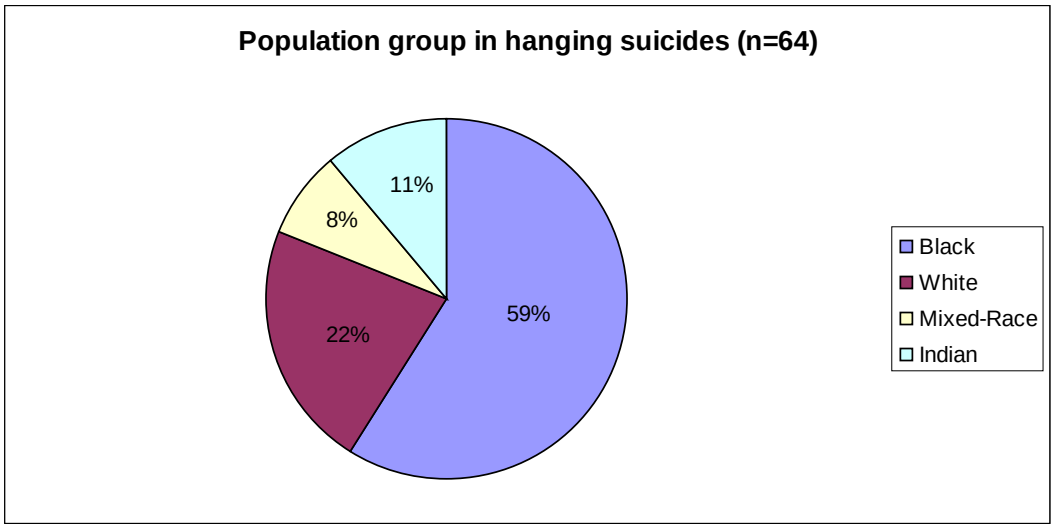

Figure 19: Population group in hanging suicides (n=64)

4.2.3.2 Population group and toxicity of ingested substance related suicides

White individuals were those whose chosen method of suicide was most commonly that of toxicity of ingested substance. The toxicity of the ingested substance was determined to be suicidal in this study based on the history accompanying the deceased on the SAP 180 document. There were 40 recorded toxicity of ingested substance related suicides in total and 22 (55%) of the deceased individuals were classified as White, 11 (28%) were classified as Black, 4 (10%) were classified as Coloured and 3 (7%) were classified Indian. See Figure 20 to follow.

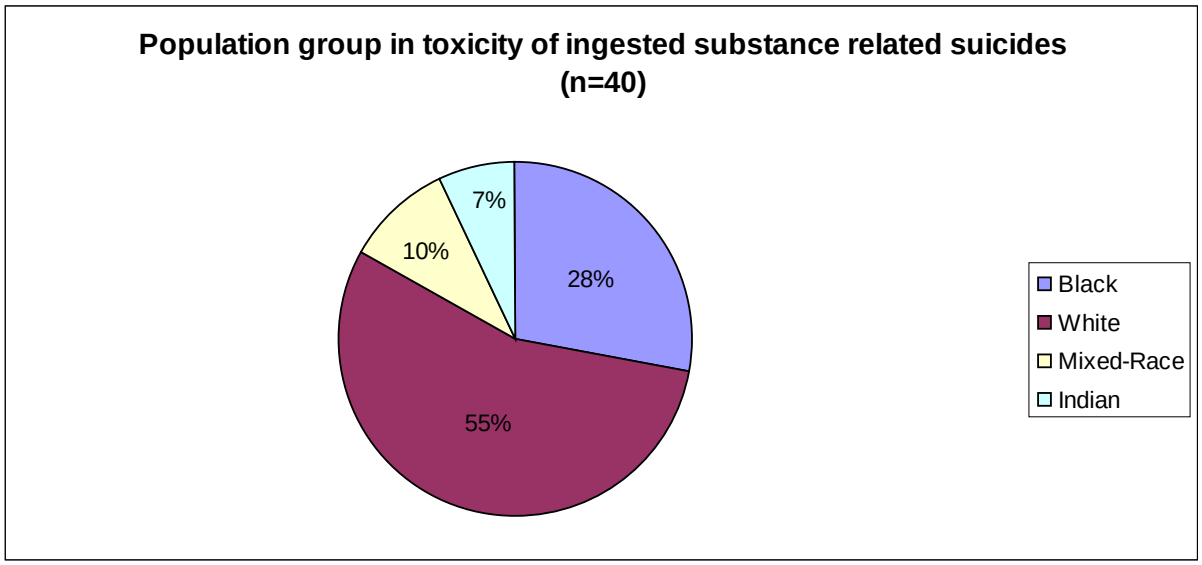

Figure 20: Population group in toxicity of ingested substance related suicides (n=40)

4.2.3.3. Population group in carbon monoxide related suicides

It has been noted that carbon monoxide related suicides are more common in White Individuals. It was seen that White individuals (4/5) comprised 80% of the carbon monoxide related suicide sample. There was one black individual noted in the carbon monoxide related suicide sample (20%). There were no Coloured or Indian deceased individuals in this category. Figure 21 (below) demonstrates these differences seen in population grouping in carbon monoxide related suicides.

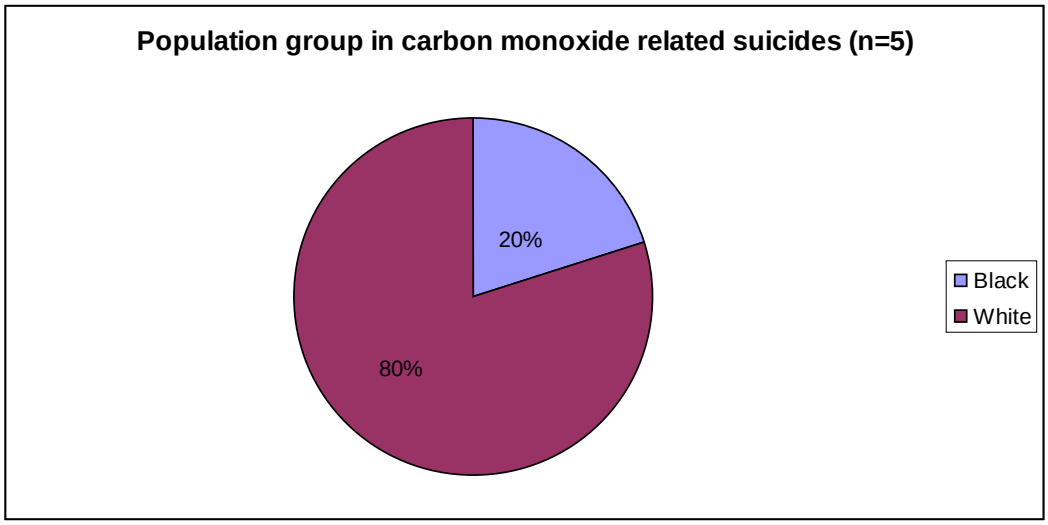

Figure 21: Population group in carbon monoxide related suicides (n=5)

4.2.3.4. Population group in multiple methods of suicide

As was seen in the carbon monoxide related suicides category previously, the multiple methods of suicide category was also mostly comprised of White individuals (56%, 5/9). The remainder of this category was equally distributed between the Black and Coloured population groups. Figure 22 below highlights these differences noted in population group in terms of multiple methods of suicide.

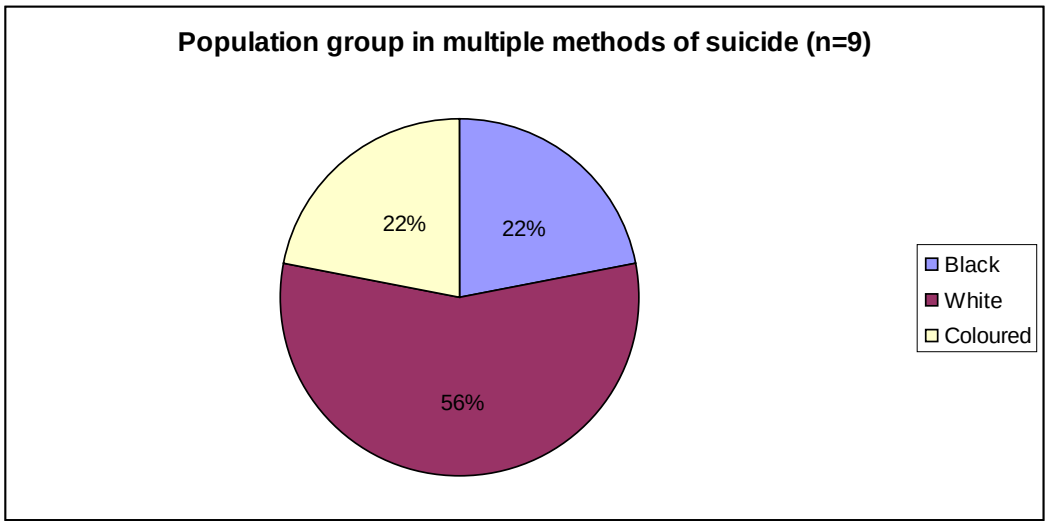

Figure 22: Population group in multiple methods of suicide (n=9)

4.2.3.5 Population group and firearm related suicides

There were a total of 15 (10%) firearm related suicides in the sample. It was noted that none of the individuals who had used this chosen method of suicide were of Coloured or Indian descent. The only individuals in this category were Black or White individuals and the numbers between these two groups were similar with 7 (47%) Black individuals and 8 (53%) White individuals using this method of suicide. This is illustrated in Figure 23.

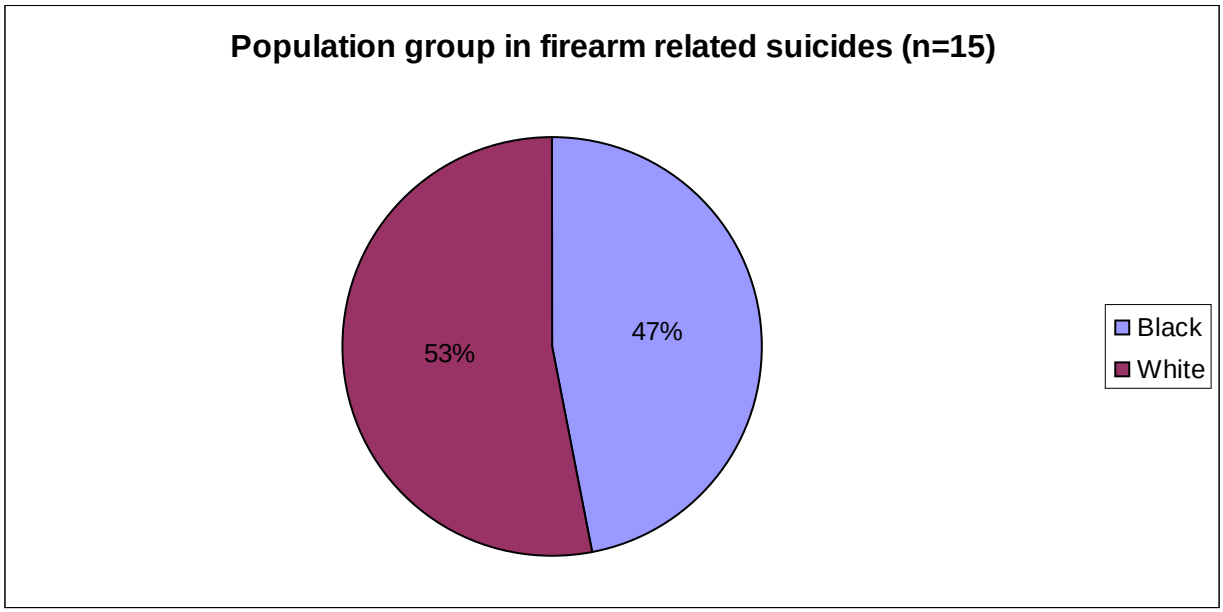

Figure 23: Population group in firearm related suicides (n=15)

4.2.3.6 Population group and jump from height related suicides

Almost all of the cases of jump from height in this sample were Black individuals. There were 12 (8%) jump from height suicides in the sample and 11 (92%) of these comprised Black individuals with only one White individual (8%). Again, it is noted in this category that there are no Coloured or Indian individuals using jump from height as their chosen method of suicide. Figure 24 demonstrates the percentages seen in terms of race and jump from height related suicides.

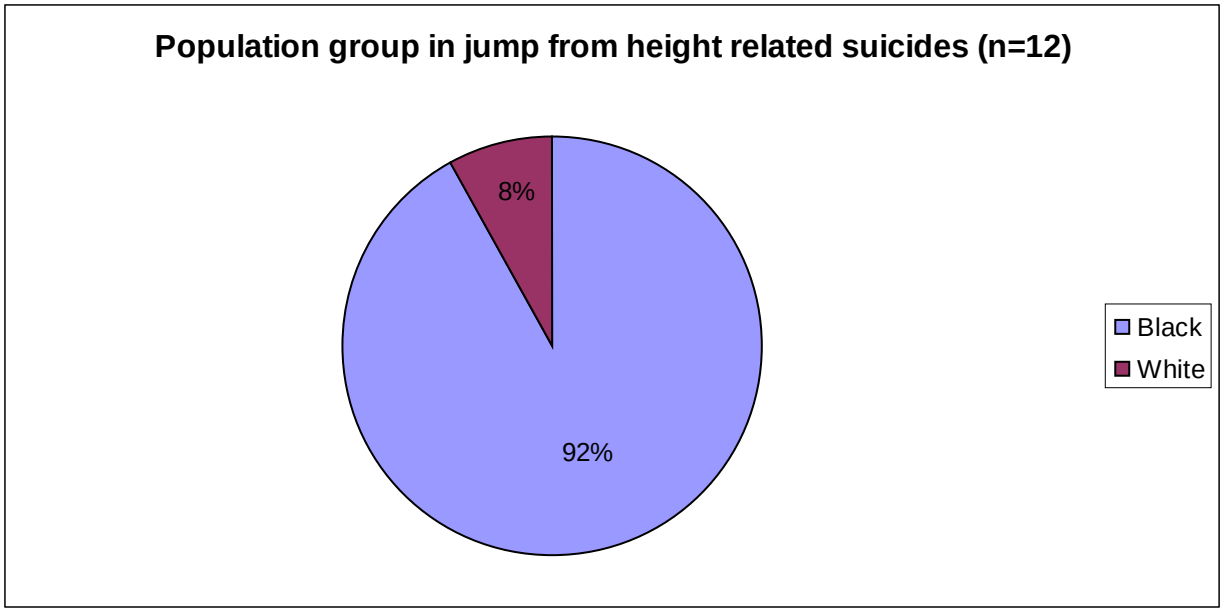

Figure 24: Population group in jump from height related suicides (n=12)

4.3 EXTRERNAL PATTERNS OF INJURY ASSOCIATED WITH METHOD OF SUICIDE

The external of patterns of injury (type of wound and region of wound) associated with the method of suicide were considered in terms of the types of wounds as well as the region of wounds. These various external of patterns of injury will be considered for each method of suicide respectively. The overall suicide population displayed various types of abrasions (55%) (80/145) with most of the abrasions being friction ligature abrasions concentrated at the region of the neck, a finding consistent in cases of hanging. No external injuries were noted in 27% (39/145) of the population, the majority of which were toxicity of ingested substance related suicides. Toxicity of ingested substance related suicides will not always show external patterns of injury as the injury occurring is often internal. Some individuals had a variety of wound types present on the body, such as abrasions and lacerations. Figure 25 highlights the various wound categories noted in the overall suicide population. Figure 26 depicts the region of these

wounds in the suicide population. The percentages seen in Figure 26 represent that some of the deceased individuals had wounding in a variety of regions and not just one region, such as head, chest and extremities.

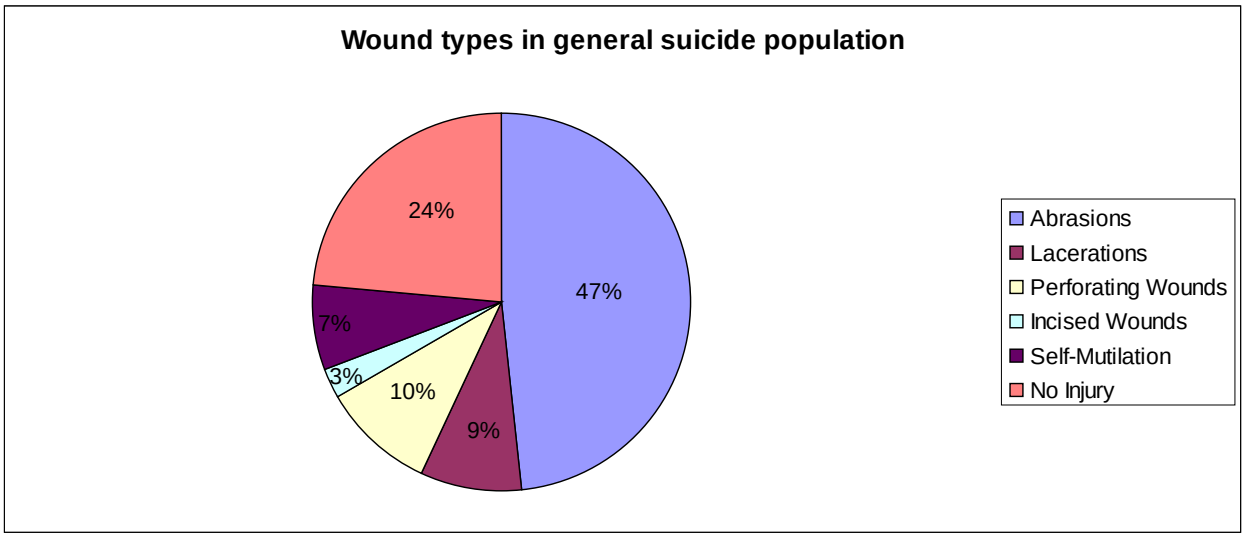

Figure 25: Wound types in general suicide population

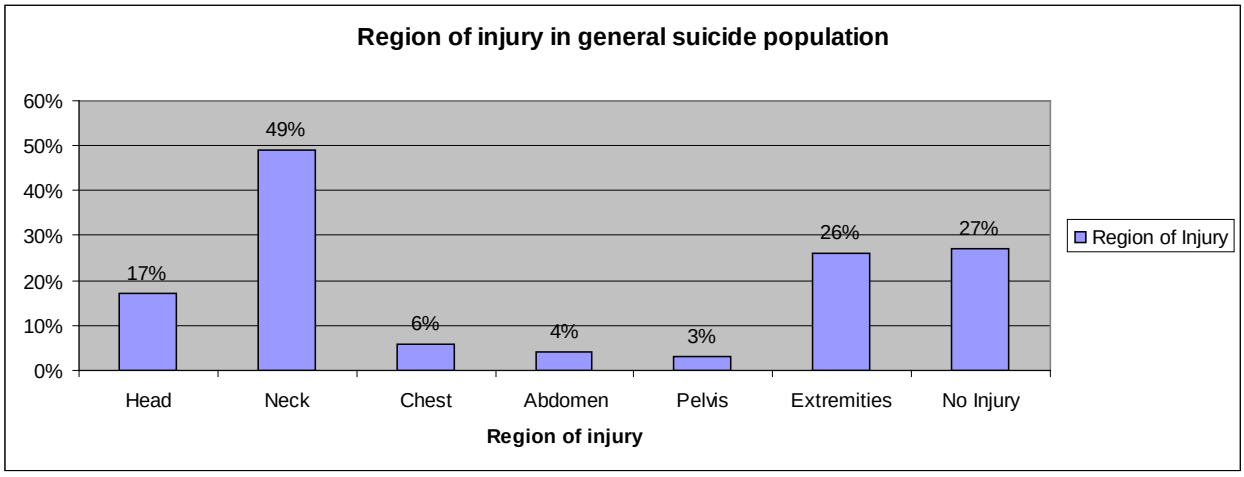

Figure 26: Region of injury in general suicide population

4.3.1 External patterns of injury in hangings

The only type of wounding present in the hanging sample was that of friction ligature abrasions (Figure 27). These were seen in 100% (64) of the sample and these were all localized to the neck region. There were no other external of patterns of injury noted in

this portion of the sample other than self-mutilation which was only seen in 3% (2/64) of the hanging population. All aspects of self-mutilation in the sample will be reported later in the results section.



Figure 27: Example of ligature in a hanging case

4.3.2 External patterns of injury in toxicity of ingested substance related suicides

There were no noted external patterns of injury relating to cause of death noted in the toxicity of ingested substance related suicides. Self-mutilation was however observed in 15% (6/40) of this portion of the suicide population.

4.3.3 External patterns of injury in carbon monoxide related suicides

None of the carbon monoxide related suicides exhibited external of patterns of injury other than self-mutilation, which was only noted in 9% (1/11) the sample.

4.3.4 External patterns of injury in multiple methods of suicide

The multiple methods of suicide category displayed abrasions to the neck in 78% (7/9) of the sample, and 11% (1/9) of the sample presented with abrasions to the chest. Abrasions to the chest as well as lacerations to the head and extremities were seen in one of the cases where the individual had jumped off a bridge and was then knocked over by a car.

Lacerations and incised wounds to the neck were seen in a case where the individual had cut his own throat with glass. This individual had allegedly raped a girl and was then arrested. He then broke a window while in custody and cut his own throat using the glass from the window. Figure 28 to follow highlights the regions where injury was noted in the multiple methods of suicide category.

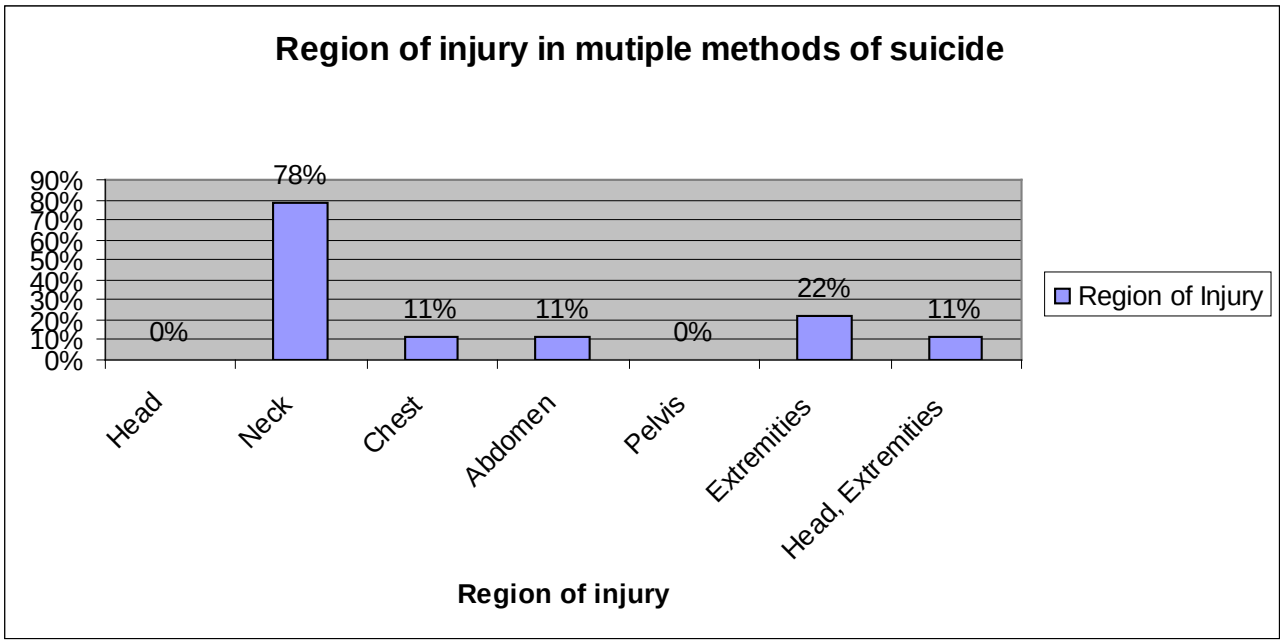

Figure 28: Region of injury in multiple methods of suicide

4.3.5 External patterns of injury in firearm related suicides

All (100%) of the wounding seen in firearm related suicides were penetrating lacerations (Figure 29), of which 93% (14/15) were to the head and 7% (1/15) to the chest. There were no other external patterns of injury noted in the firearm related suicides besides self-mutilation which was only seen in 7% (1/15) of the firearm related suicides.



Figure 29: Example of penetrating laceration in a firearm related suicide

4.3.6 External patterns of injury in jump from height related suicides

The injuries sustained in jump from height related suicides indicated a great amount of variety in terms of the types of injury as well in the regions of injury. Of the individuals in this sample, 58% (7/12) displayed blunt force wounding to the head and extremities concurrently, 25% (3/12) to the head on its own, and 50% (6/12) to the extremities on their own. A further 8% (1/12) of these individuals exhibited blunt force injuries to the chest, 17% (2) to the head, pelvis and extremities together, 8% (1/12) to the head abdomen and extremities and 8% (1/12) to the chest and extremities. The most common

type of wounds noted were lacerations (92%) (11/12) and abrasions (83%) (10/12). Eight percent (1/12) had penetrating lacerations to the chest where an object had been driven through the chest upon landing. Figure 30 demonstrates the different types of wounds seen in jump from height related suicides.

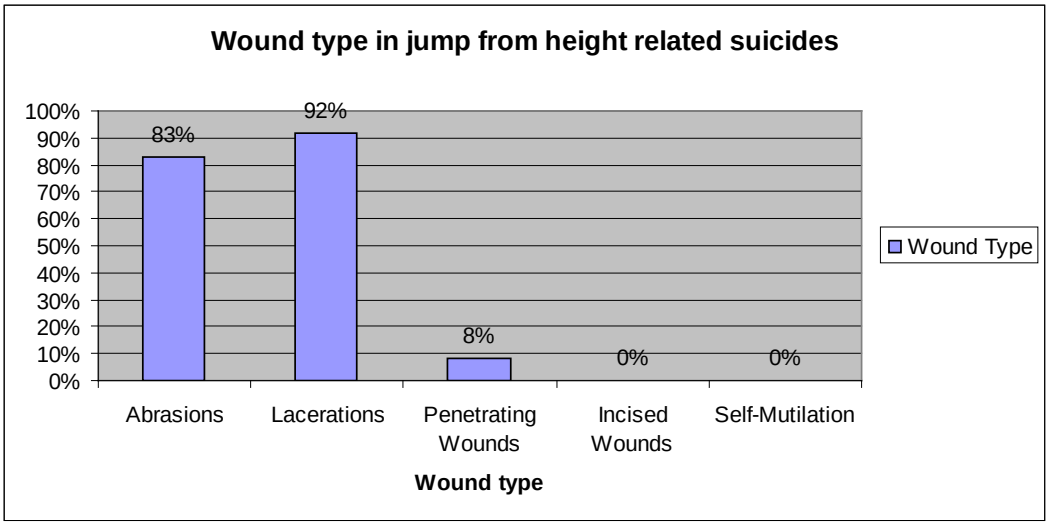

Figure 30: Wound type in jump from height related suicides

Figures 31 shows the regions of wounding seen in jump from height related suicides. None of these deceased individuals had indications of self-mutilation.

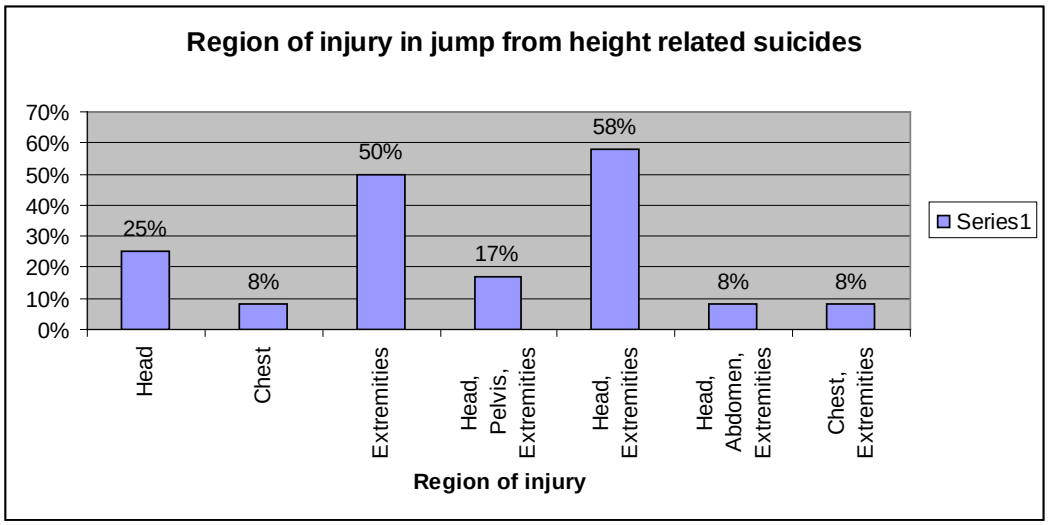

Figure 31: Region of injury in jump from height related suicides

4.4 DEMOGRAPHICS OF THE SELF-MUTILATION SAMPLE

The demographics of those with a history of self-mutilation will be considered in terms of age, sex and population group.

4.4.1 Age in the self-mutilation sample

Of the 145 suicides collected from this research, 11 exhibited a history of self-mutilation in terms of scarring and recent cutting. The mean age of the self-mutilation sample was 31 years with a standard deviation of 11 years and a variance of 121.

In terms of age group, 55% (6/11) of the self-mutilation sample where aged between 18 and 28 years old. The self-mutilation sample also highlighted that besides the younger age groups, 18% (2/11) were between 29 and 38 years old, 18% (2/11) were between 39 and 48 years old and finally 9% (1/11) were between 49 and 58 years old. Those with recent unhealed cutting (27%) (3/11) were in the youngest age category of 18 to 28. The rest of those with scarring were noted in the other age ranges of 18-28 years, 29- 38 years, 39- 48 years and 49-58 years (Figure 32).

Toxicity of ingested substance related suicide was the most common method of suicide chosen by those in the 18 to 28 age group whereas hanging and firearm related suicides was the chosen methods of those in the older age groups. Chi ^{2} analyses indicated that age was however statistically insignificant in the self-mutilation sample.

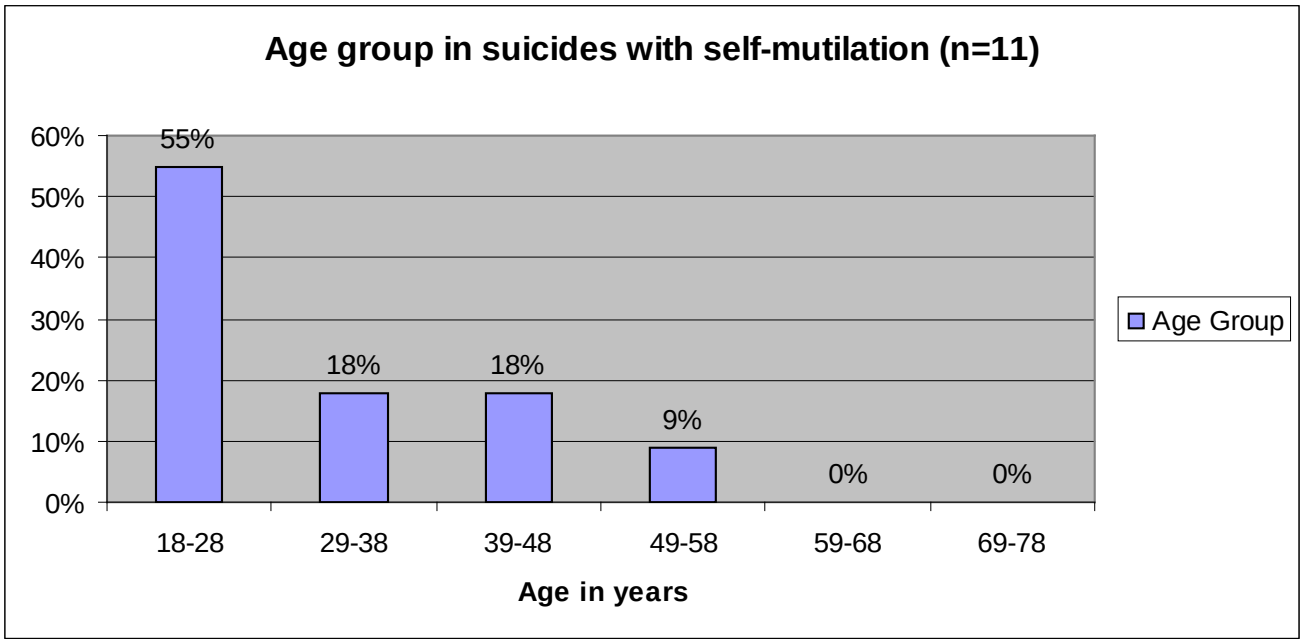

Figure 32: Age group in suicides with self-mutilation (n=11)

4.4.2 Sex in the self-mutilation sample

The most common sex seen in the self-mutilation sample were male individuals (64%) (7/11) and only 36% (4/11) were female individuals (see Figure 33). The most common method of suicide in the female sample of self mutilators was toxicity of ingested substance related suicides, whereas males used hanging, toxicity of ingested substance related suicide as well as multiple methods as their chosen method of suicide. The female self-mutilation sample was spread across all the age categories whereas males tended to be in the younger age group of 18-28 years old. Sex and self-mutilative scarring was determined to be statistically insignificant according to Chi^2 analyses. Sex and unhealed cutting was however determined to be statistically significant in females with a p value of 0.002, suggesting that females were more likely to self-mutilate shortly prior to committing suicide. Sex and multiple self-mutilations (more than 3 scars or cuts) were also statistically significant in males with a p value of 0.041. This suggests that males may be more inclined to engaging in self-mutilation on multiple occasions.

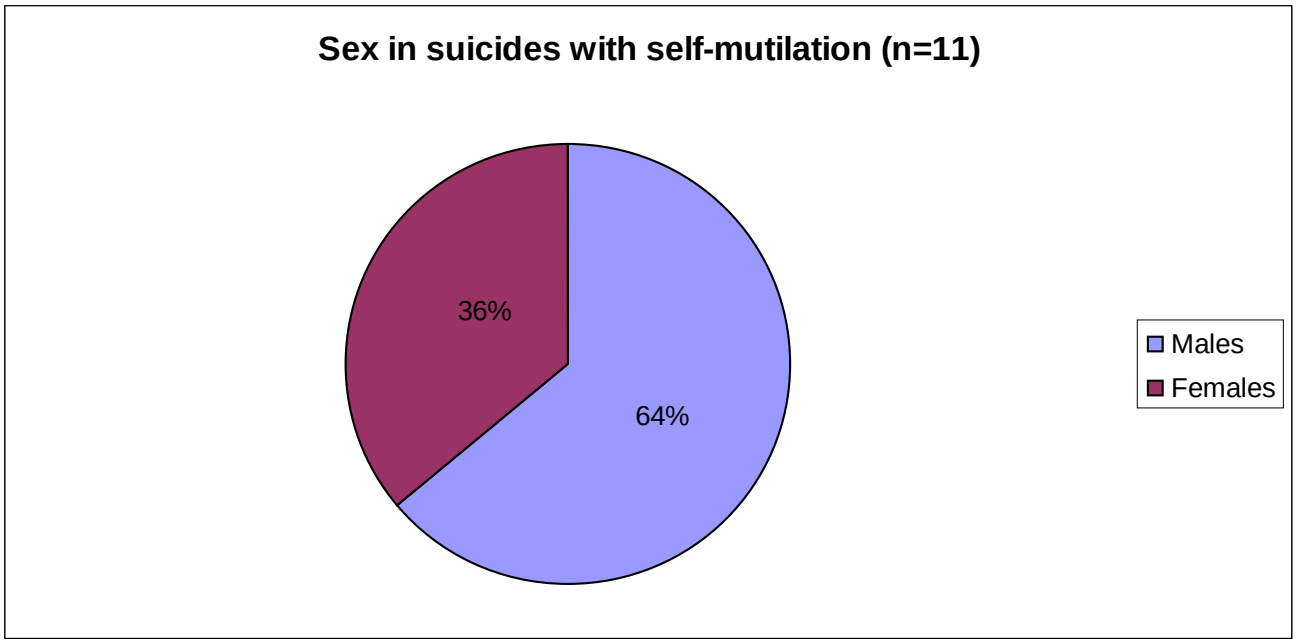

Figure 33: Sex in suicides with self-mutilation (n=11)

4.4.3 Population group in the self-mutilation sample

In terms of population group, 91% of the self-mutilation sample were White individuals (10/11) and 9% were Coloured individuals (1/11). There were no Black or Indian individuals in the self-mutilation sample. Population group and unhealed cutting was determined to be statistically insignificant based on Chi ^{2} analysis. Population group and scarring was however determined to be statistically significant in White individuals with a p value of 0.001. This statistical significance indicates that the White suicide population is most likely to have a history of self-mutilative scarring than any other population group. Population group and multiple self-mutilation (healed and unhealed) was also determined to be statistically significant in White individuals with a p value of 0.013, again indicating that the White suicide population are those most likely to have a history of self-mutilation. Figure 34 highlights the percentages of White and Coloured individuals in the self-mutilation sample.

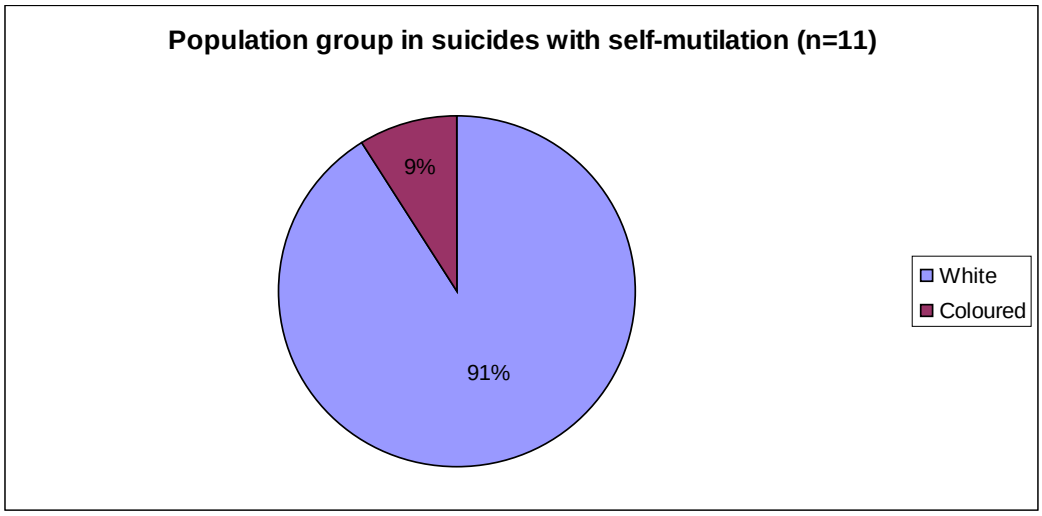

Figure 34: Population group in suicides with self-mutilation (n=11)

4.5 METHOD OF SUICIDE IN THE SELF-MUTILATION SAMPLE

The most common form of suicide in the self-mutilation sample was toxicity of ingested substance related suicide (55%, 6/11). Other methods of suicide noted in this sample were hangings (18%, 2/11), carbon monoxide related suicides (9%, 1/11) multiple methods (9%, 1/11) and firearm related suicide (9%, 1/11). Hanging and toxicity of ingested substance was the only multiple method of suicide noted in this sample. See figure 35 to follow.

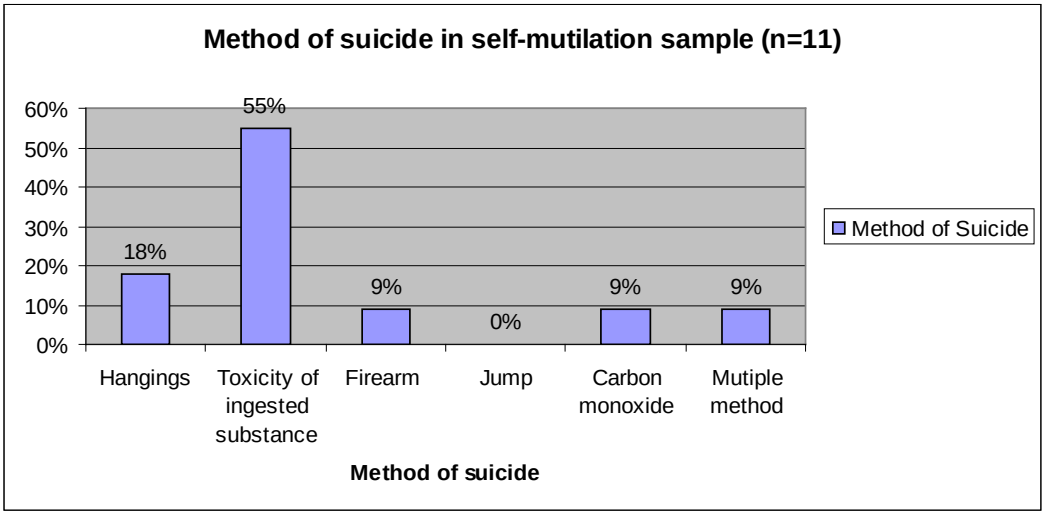

Figure 35: Method of suicide in the self-mutilation sample (n=11)

4.6 EXTERNAL PATTERNS OF INUJURY IN THE SELF-MUTILATION SAMPLE

Because the chosen method of suicide in the self-mutilation sample was most commonly toxicity of ingested substance related and hanging, the external of patterns of injury associated with these suicide methods were mostly friction ligature abrasions to the neck (27%, 3/11) which were entirely related to the hanging cases. The entire self-mutilation sample displayed scarring as well as multiple self-mutilations indicated by incised wounds, burns and scars; however only 27% of the sample exhibited unhealed incised wounds. Therefore the self-mutilation evident in this sample suggested repeated behaviour over time.

Of the self-mutilation scarring seen in the sample, 82% (9/11) of the self-mutilation wounding was to the extremities, including the lower inner arms, upper inner arms, upper outer arms, lower outer arms, inner thighs, outer thighs and lower legs. In terms of unhealed self-mutilation, 18% (2/11) of the female individuals presented with unhealed self-mutilation wounding to the abdomen and 9% (1/11) of unhealed cutting to the extremities. Figure 36 demonstrates the percentages of self-mutilation in terms of scarring, unhealed cutting and multiple self-mutilations. As is seen in Figure 36, none of those in the self-mutilation sample showed single self-mutilation, but only instances of multiple self-mutilative scarring and incised wounds.

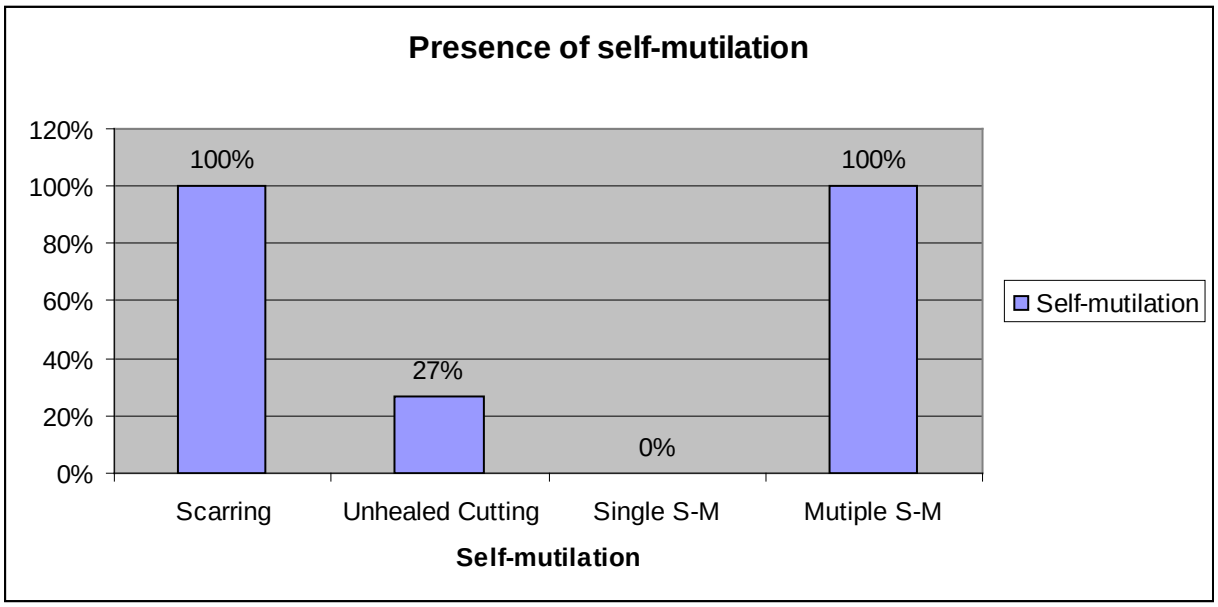

Figure 36: Presence of self-mutilation

Figure 37 highlights the regions where unhealed cutting was noted, namely abdomen as well as the upper and lower extremities.

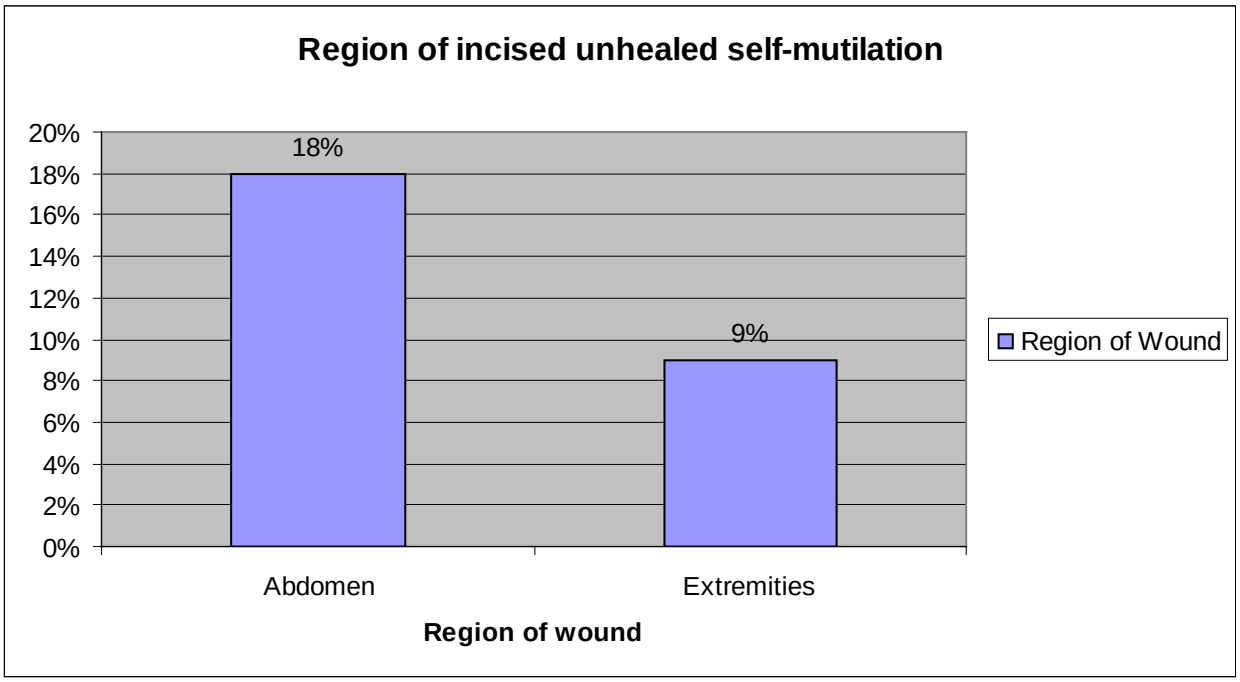

Figure 37: Region of incised unhealed self-mutilation

4.7 DESCRIPTIONS OF INDIVIDUAL CASES OF SELF-MUTILATION

The cases of self-mutilation noted in this study will each be considered separately. The identity of the individuals discussed will not be made available. Any identifying features in the following descriptions and photo's have been removed so as to maintain confidentiality and anonymity of these individuals. Personal histories of these individuals was not collected and the only information collected included information from the body during the medico-legal autopsy as well as information obtained from the medico-legal autopsy report. All of the following photographs were taken by the researcher during attendance of medico-legal autopsy.

4.7.1 Person A

Person A was a White male individual who was 30 years old at the time of death. This individual used hanging and toxicity of ingested substance together as a multiple method of suicide. The body was found with a prescription bottle of Azor (an anti-hypertensive medication often used in the treatment of anxiety) which indicates that this individual was seeking some sort of help prior to committing suicide as his name was on the prescription bottle. Self-mutilative scarring was very extensive on this individual and was present on both of the inner arms (upper and lower), wrists and both inner thighs (Figure 38). Scarring on the wrists (Figure 39) may be indicative of a previous suicide attempt. The scarring however is also notable on the upper inner arms and thighs suggesting that these scars are self-mutilative in nature. The ageing of the scarring seen in this individual was older than 6 months as the scars were white and contracted. Additional pictures of the self-mutilation could not be included as these scars were present on/ or near the deceased tattoos and inclusion of these images is not permitted according to ethical and medico-legal regulations.

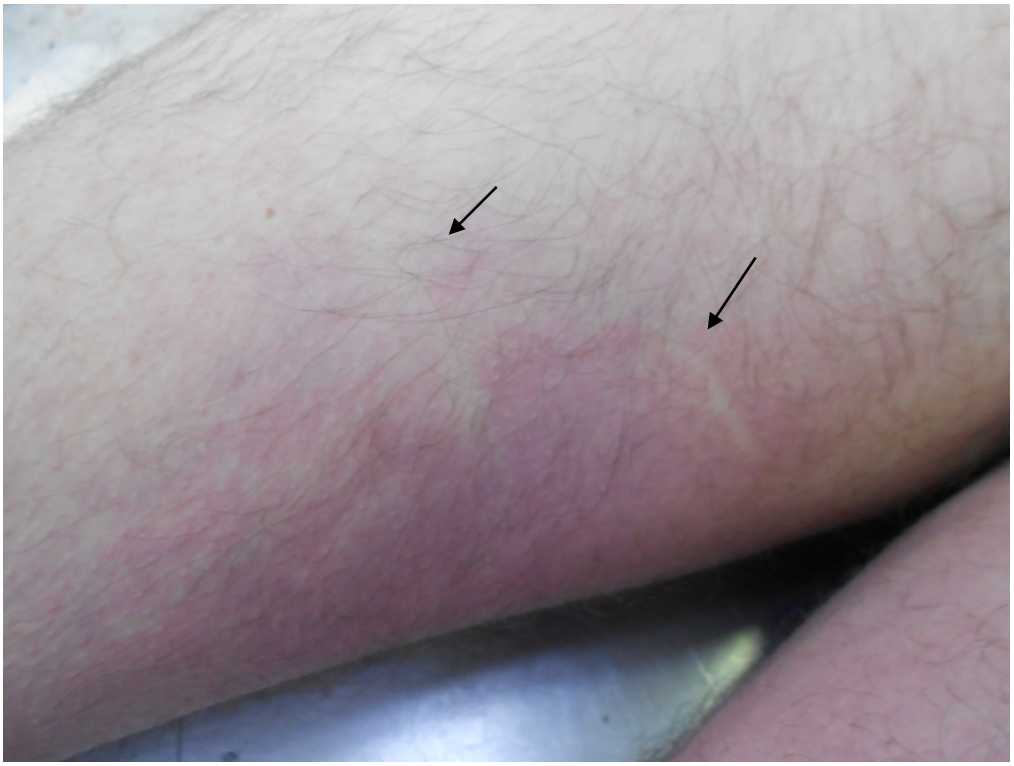

Figure 38: Person A-Scarring on inner thighs

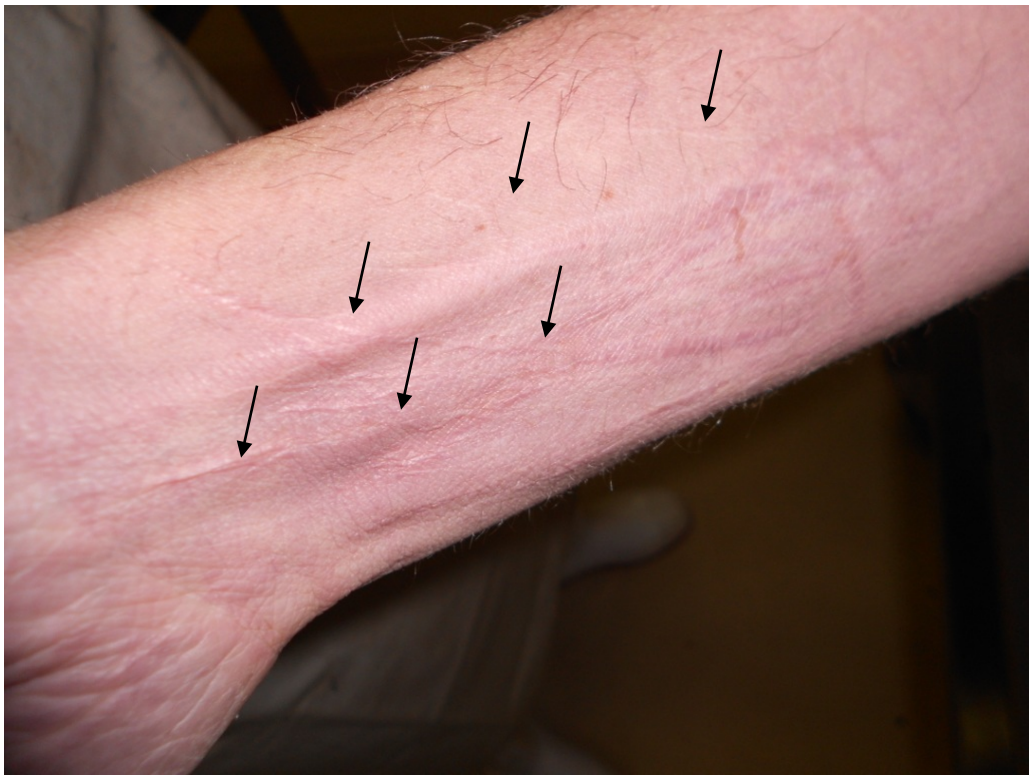

Figure 39: Person A-Scarring on right inner wrist

4.7.2 Person B

Person B was a 27 year old White male individual who had used carbon monoxide as his chosen method of suicide. This individual's self-mutilative scarring wasn't as extensive as seen on the other 10 cases and was noted on the inner lower arms (Figure 40), near the left axilla (armpit) and on the right inner thigh. Due to the nature of carbon monoxide as a method of suicide, the individual's skin is pink in the photographs and some scarring is therefore difficult to distinguish in the photographs. The scarring on Person B was aged at older than 6 months as these scars were white and contracted.

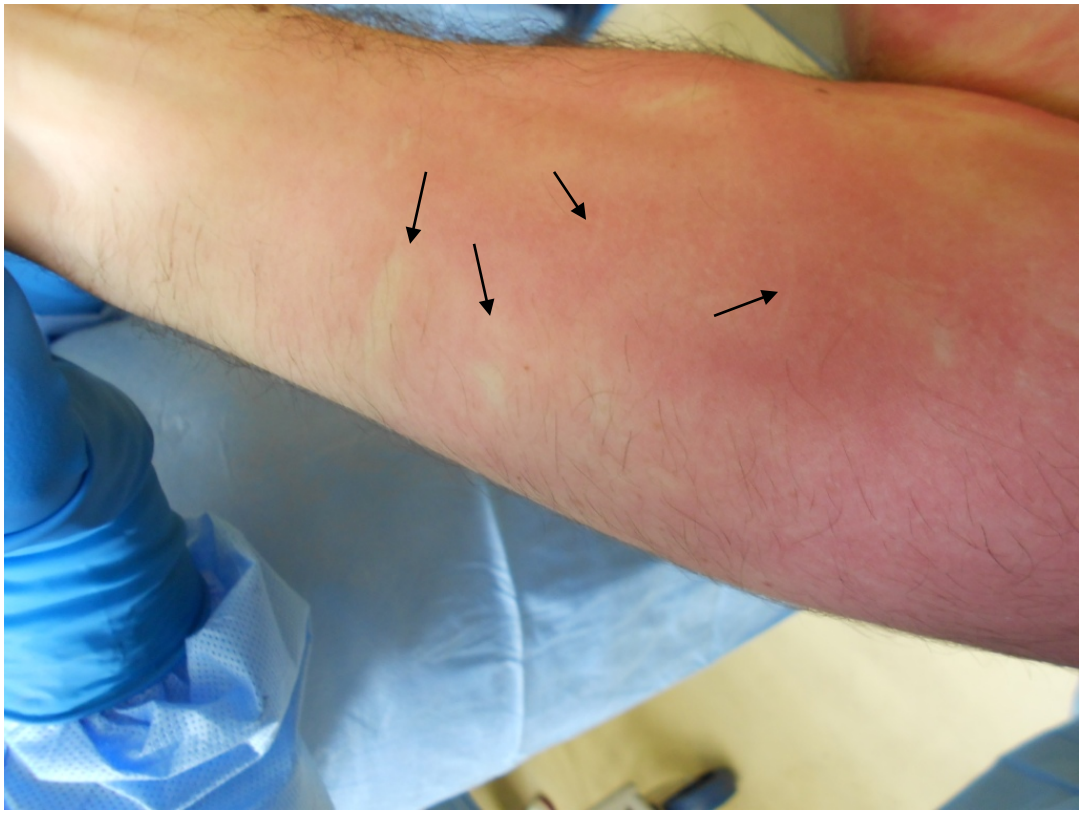

Figure 40: Person B-Self-mutilative scarring on lower inner arm

4.7.3 Person C

Person C was a 23 year old White male individual whose chosen method of suicide was toxicity of ingested substance related. This individual displays self-mutilative scarring on both inner (Figure 41) and outer arms (Figure 42) and both wrists. Again, the scarring on

the wrists may be indicative of a previous suicide attempt. This individual also had scarring caused by burns on both arms (Figure 43 and 44). These scars were all the same size and shape and were placed all over both arms. This case therefore not only had self-mutilative scarring but also self-mutilative burning. The scarring on Person C differed in terms of age as some of the scarring was older than 6 months, but some of the other scarring was between 2 and 6 months old as these scars were coppery in colour and raised. As was mentioned in terms of Person A, some pictures could not be included for Person C due to the scarring being present near identifying tattoos.



Figure 41: Person C- Self-mutilative scarring on inner arm

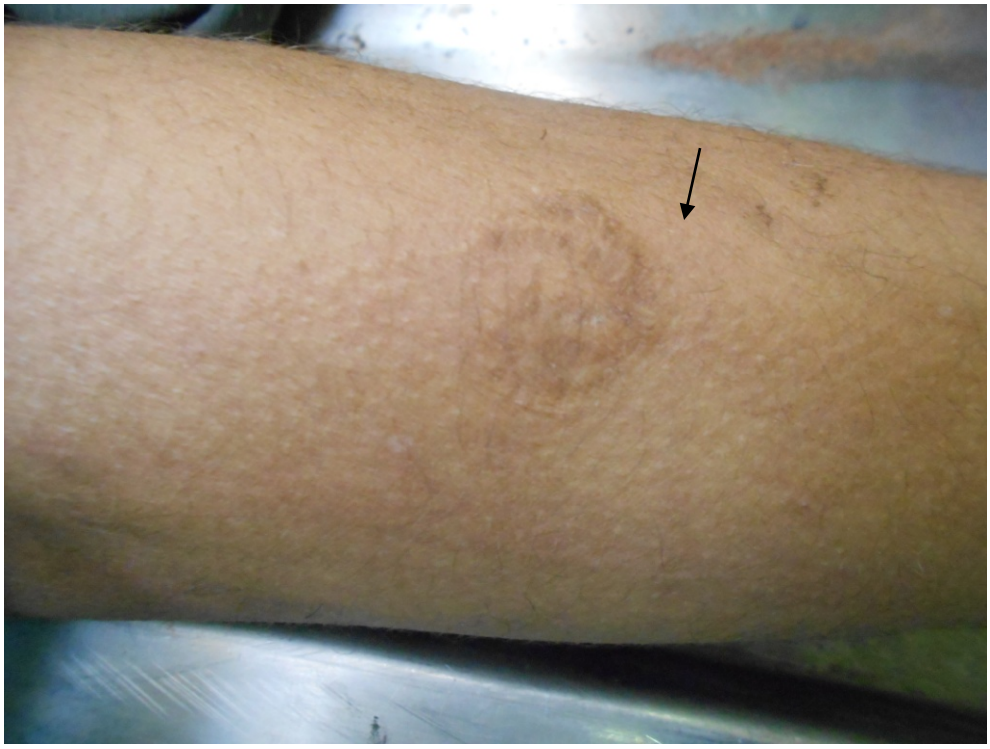

Figure 42: Person C- Self-mutilative scar (burn) on upper arm



Figure 43: Person C- Scarring on outer arm

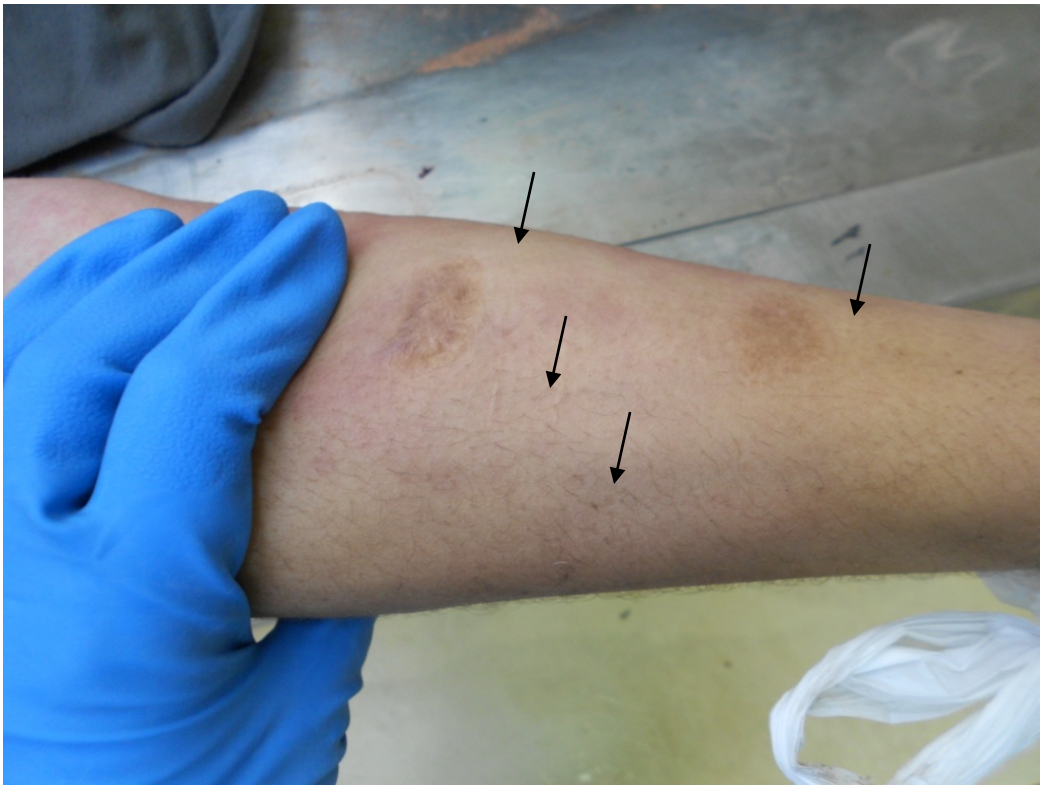

Figure 44: Person C- Burn scars on inner arm

4.7.4 Person D

Person D was a 44 year old White male individual whose chosen method of suicide was hanging. This individual had very extensive scarring on both inner thighs, wrists and arms. The scars may have been old in that they were very pale and photographs taken of the scars were, therefore, unsuccessful. The scars were definitely older than 6 months as they were white, pale and contracted to the point of being difficult to see.

4.7.5 Person E

Person E was a 23 year old White female individual who had chosen toxicity of ingested substance her method of suicide. This individual had extensive scaring on both arms and had incised the words “I hate life” onto her left inner arm (Figure 45 and 46) prior to

ingestion of toxic substance/s. Figure 47 depicts other unhealed cuts on the left arm. Person E's scarring ranged in age from just prior to death to more than 6 months old.



Figure 45: Person E- Unhealed cutting on inner left arm ("I hate life")



Figure 46: Person E "I hate life"



Figure 47: Person E- Unhealed cutting on inner arm

4.7.6 Person F

Person F was 22 year old White male individual who had used toxicity of ingested substance his chosen method of suicide. The self-mutilation evident on this individual was not as extensive as that seen on the other 10 cases and the self-mutilation was only present on the right arm and wrist (Figure 48). The presence of scars on the wrist may again be indicative of a previous suicide attempt. There was also evidence of an unhealed bite mark on the right wrist, whether this was self-inflicted is undetermined. This individuals' scarring was aged between 2 to 6 months.

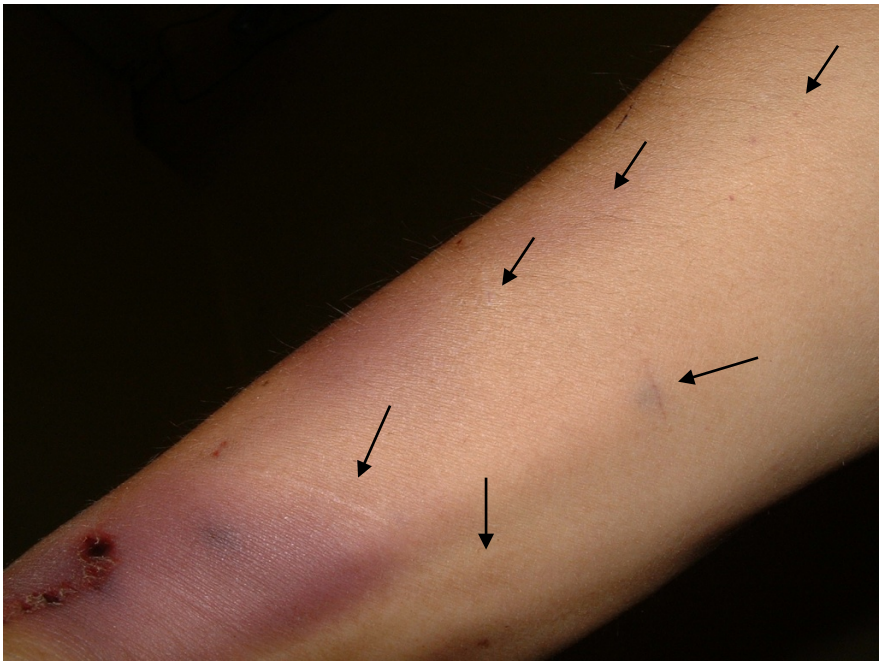

Figure 48: Person F- Scarring on inner wrist and arm

4.7.7 Person G

Person G was a 39 year old White male individual with scarring on both inner arms. The photographs taken of the self-mutilation on this individual were also unsuccessful in that the scars were very pale and therefore not visually apparent in the photographs, suggesting that the scars were more than 6 months old. Person G had committed suicide via hanging.

4.7.8 Person H

Person H was a 58 year old White female individual who had committed suicide with a firearm. This individual had extensive scarring on the wrists, lower arms (Figure 49) and upper arms. The medico-legal autopsy report had determined the scarring on the wrists (Figure 50) to be due to a previous suicide attempt. The scars on the wrists are therefore potentially due to a previous suicide attempt, with the scars on the upper arms

being indicative of self-mutilation. Scarring seen on this individual was aged at more than 6 months old.

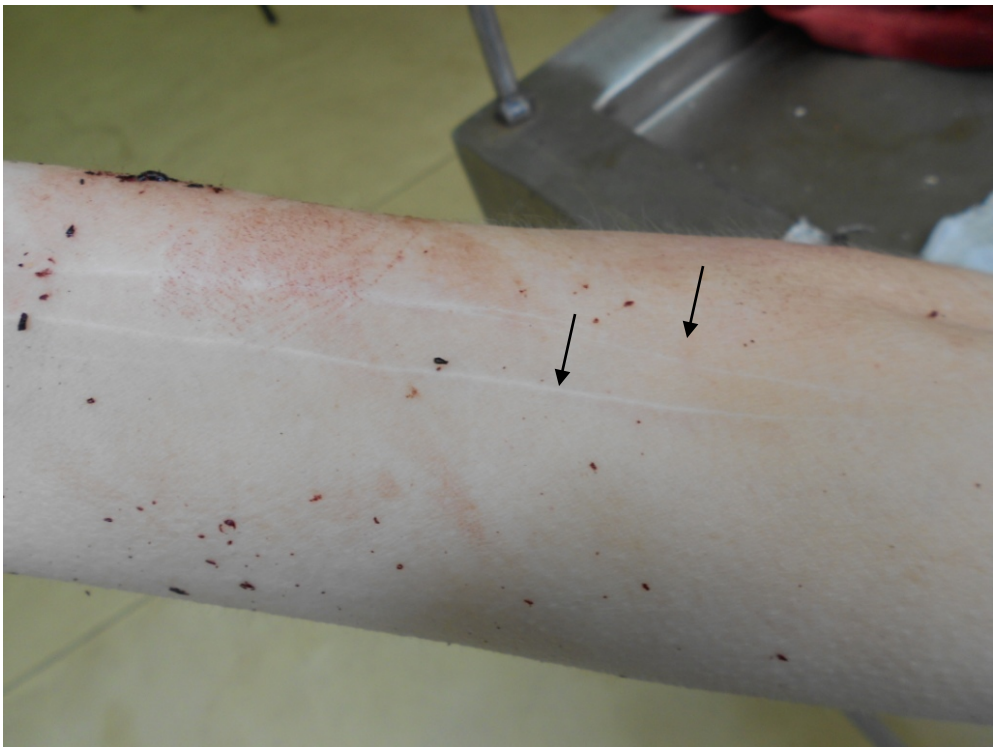

Figure 49: Person H-Scarring extending from wrist to rest of lower arm

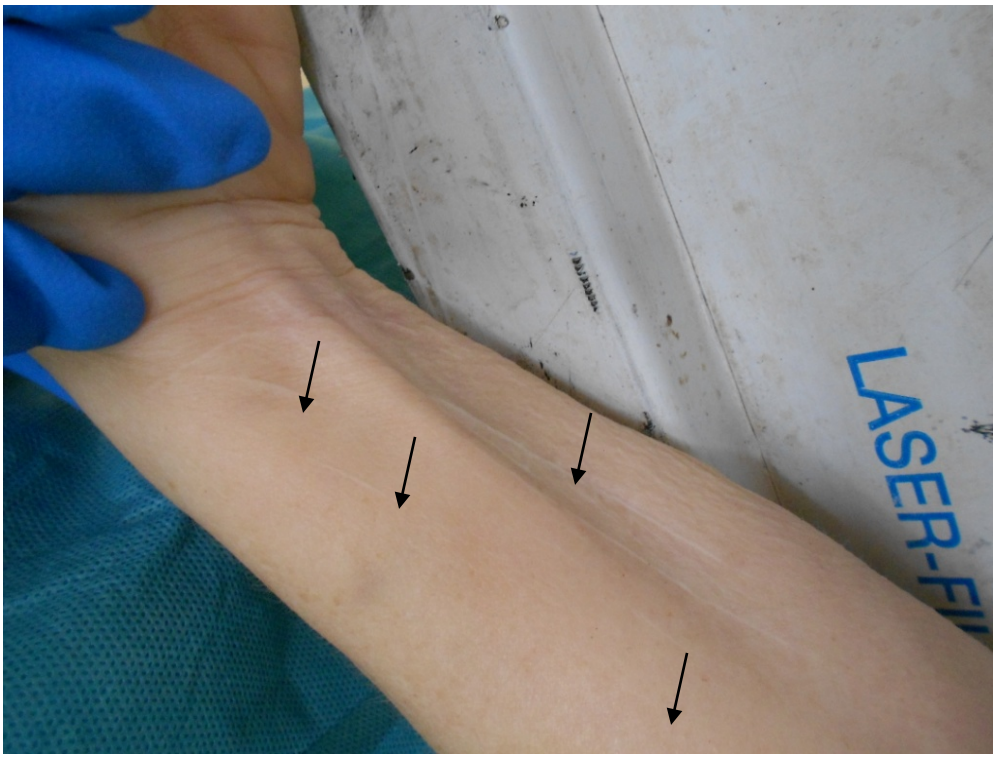

Figure 50: Person H- Scarring on left wrist

4.7.9 Person I

Person I was a 27 year old White female individual. This individual had ingested sleeping pills to commit suicide (toxicity of ingested substance related suicide). This case had the most extensive self-mutilation out of all the cases as the self-mutilation was present on all regions of the extremities as well as the abdomen. This individual had scarring, recent incised wounds and nail marks on the abdomen (Figure 52). The scarring and incised wounds noted on this individual where present on both arms (Figures 53, 54, 55 and 56), in both armpits as well as scarring on the thighs (Figure 51). New incisions were also noted on the calves. The scarring ranged in age from less than 2 months old to older than 6 months. The incisions seen were created just prior to committing suicide.

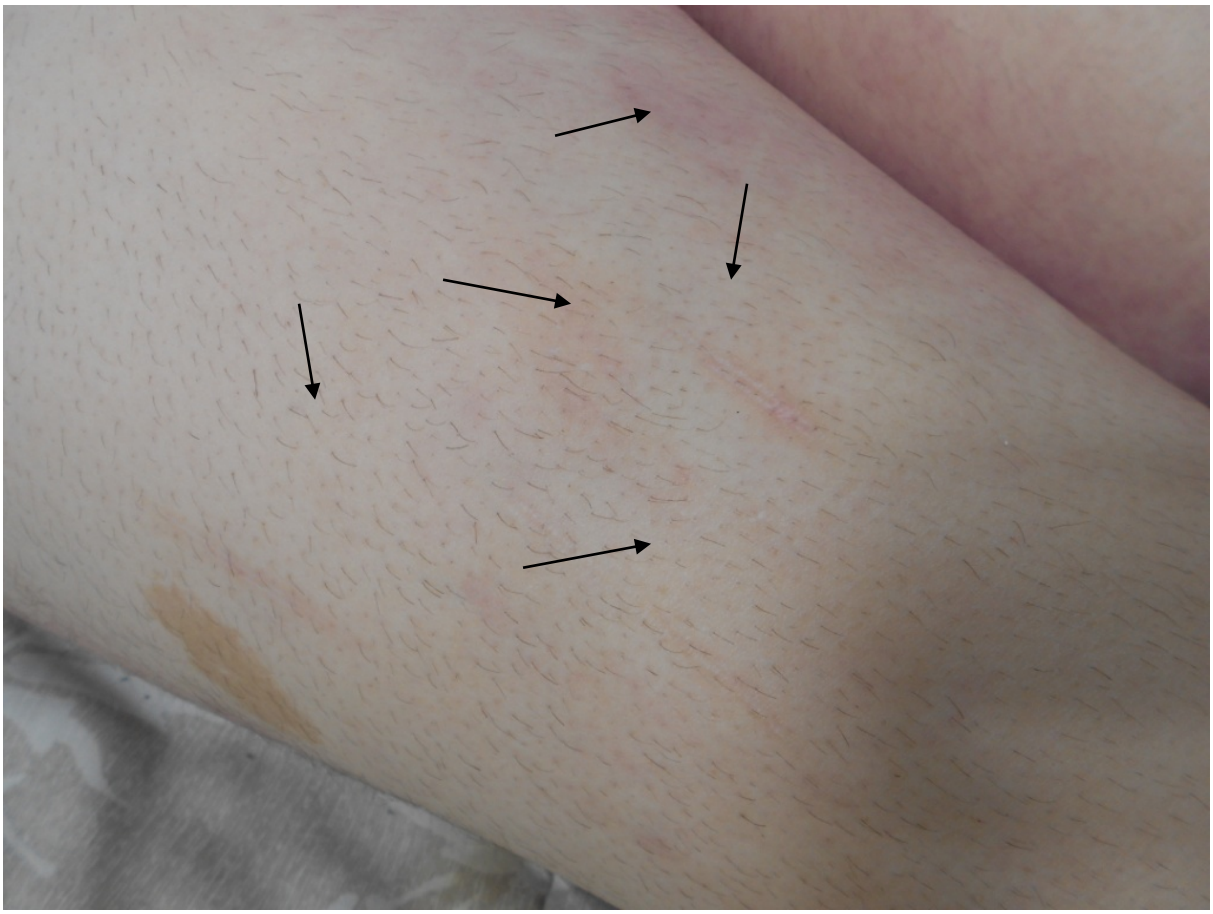

Figure 51: Person I-Scarring on right thigh

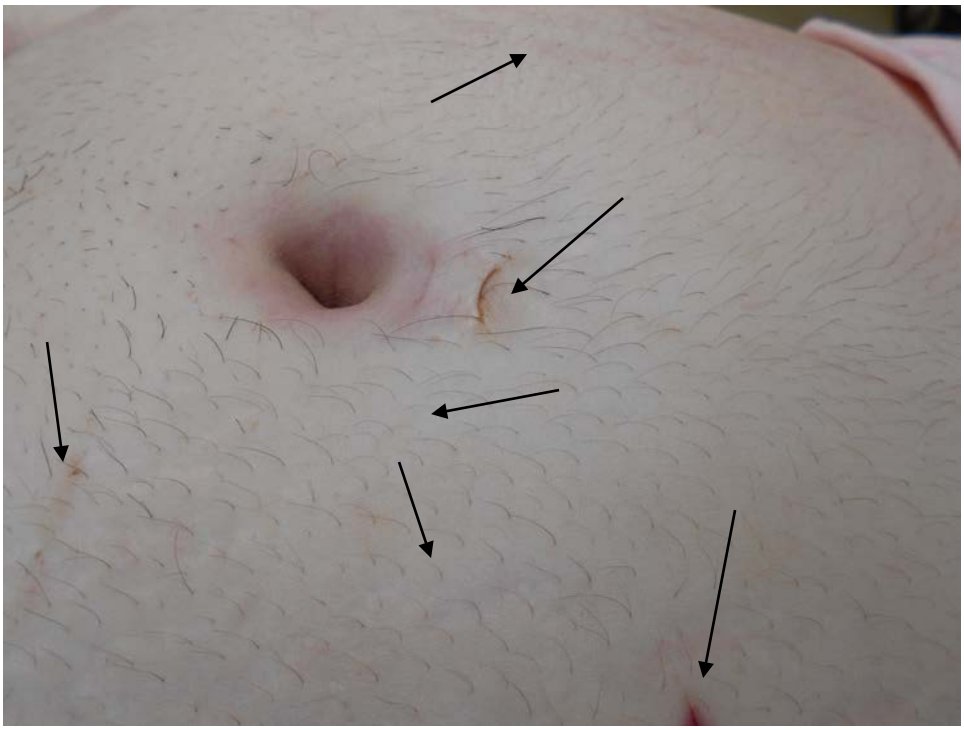

Figure 52: Person I-Scarring, incisions and nail marks on abdomen



Figure 53: Person I-Scarring and recent incisions on inner arm

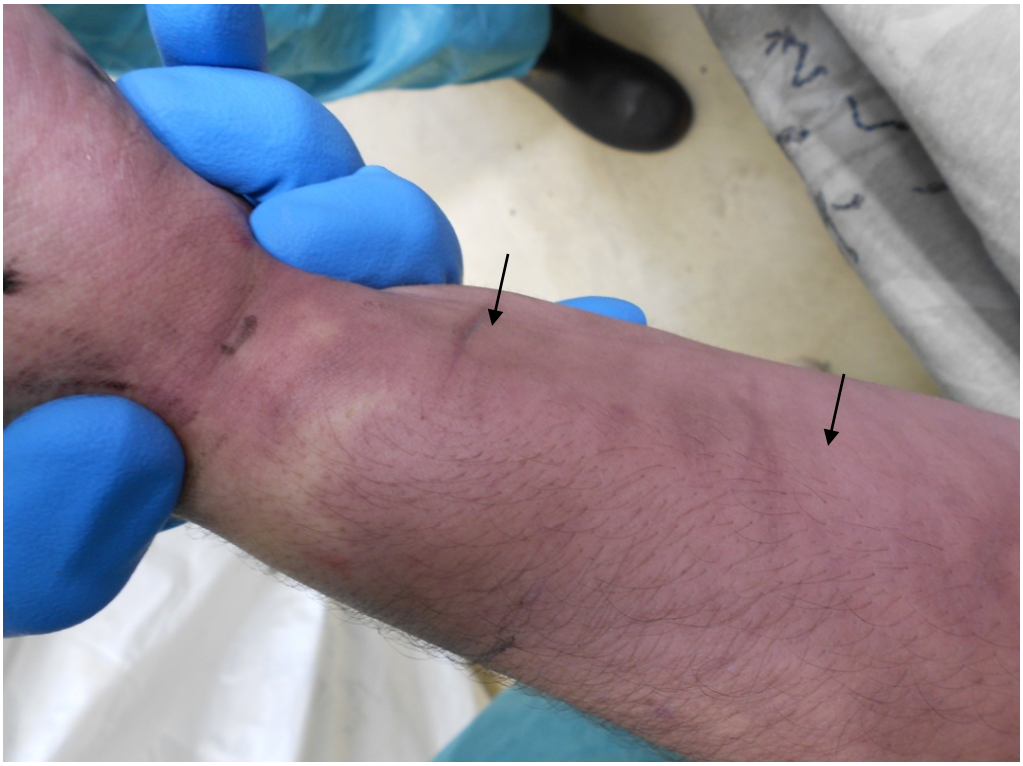

Figure 54: Person I-Scarring on inner arm



Figure 55: Person I-Scarring and recent incision on upper arm

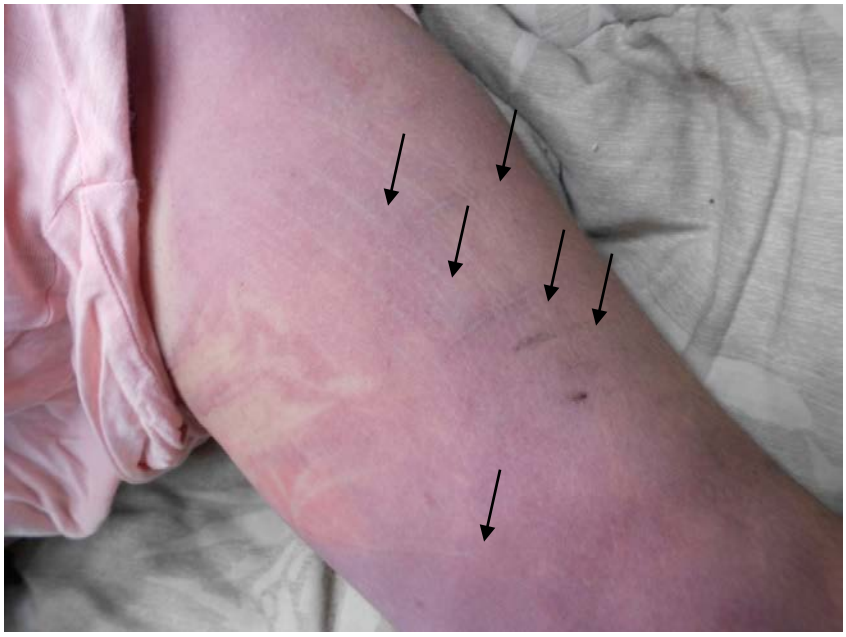

Figure 56: Person I-Scarring on upper arm

4.7.10 Person J

Person J was 27 year old Coloured male individual. His chosen method of suicide was toxicity of ingested substance and he allegedly drank drain cleaner to achieve this. This individual displayed scarring on both arms (Figure 60) and thighs (Figure 57, 58 and 59). The scarring was noted to be between 2 and 6 months old based on the colour and the raising of the scars.

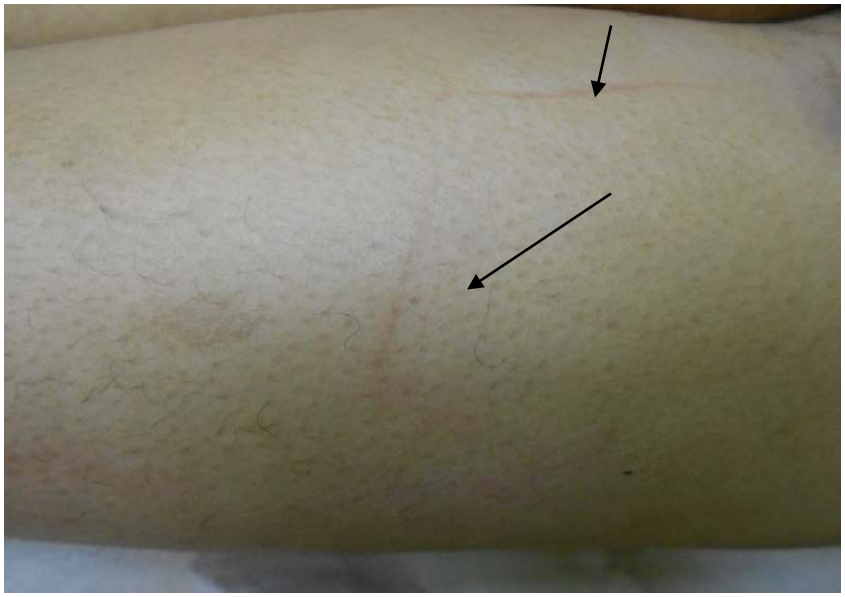

Figure 57: Person J- Scarring on left thigh

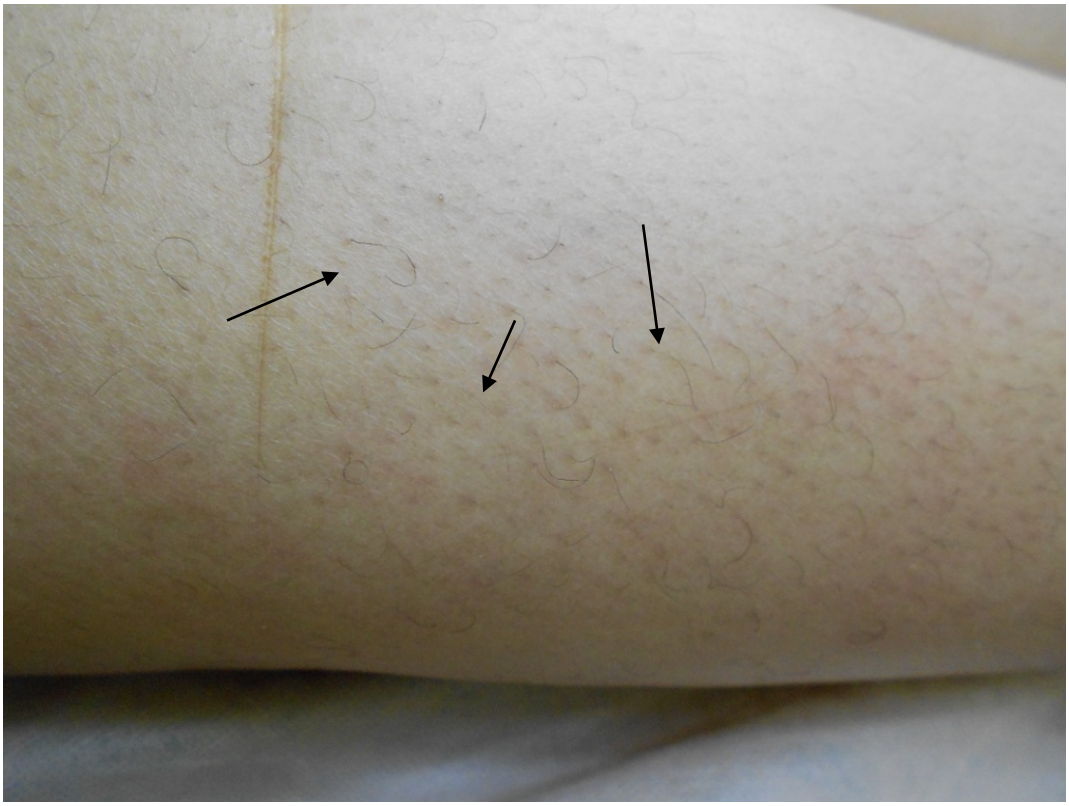

Figure 58: Person J-Scarring on right thigh

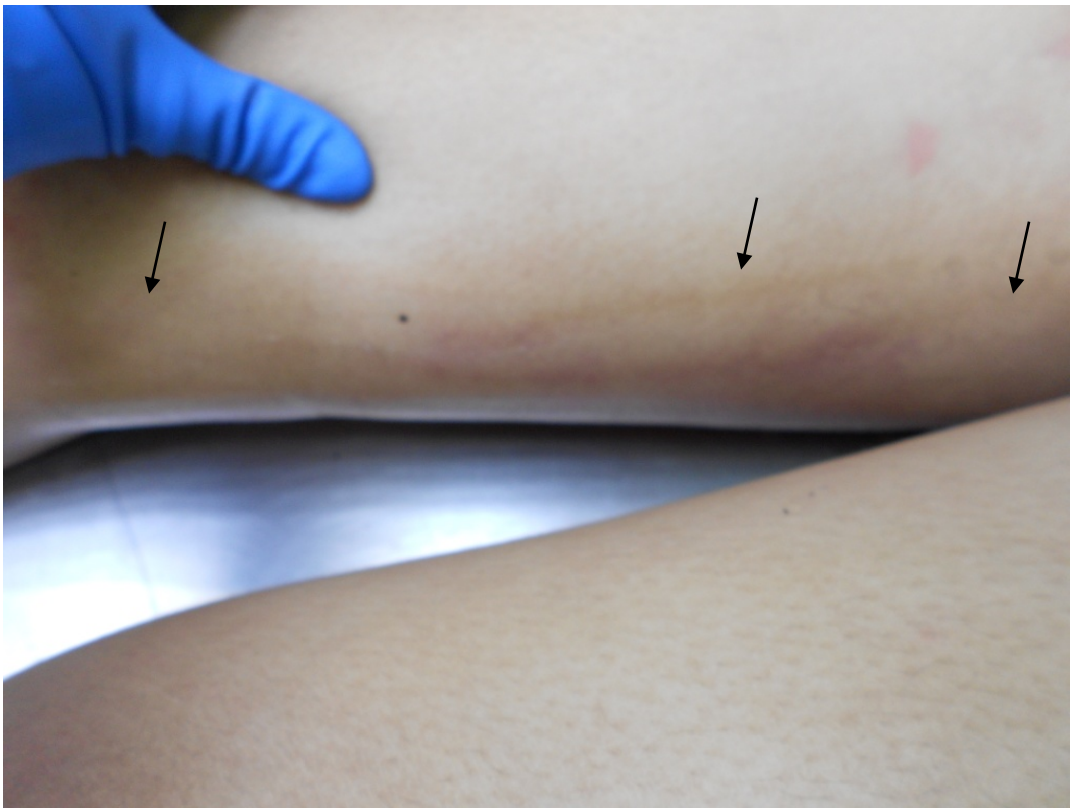

Figure 59: Person J- Scarring on inner thigh

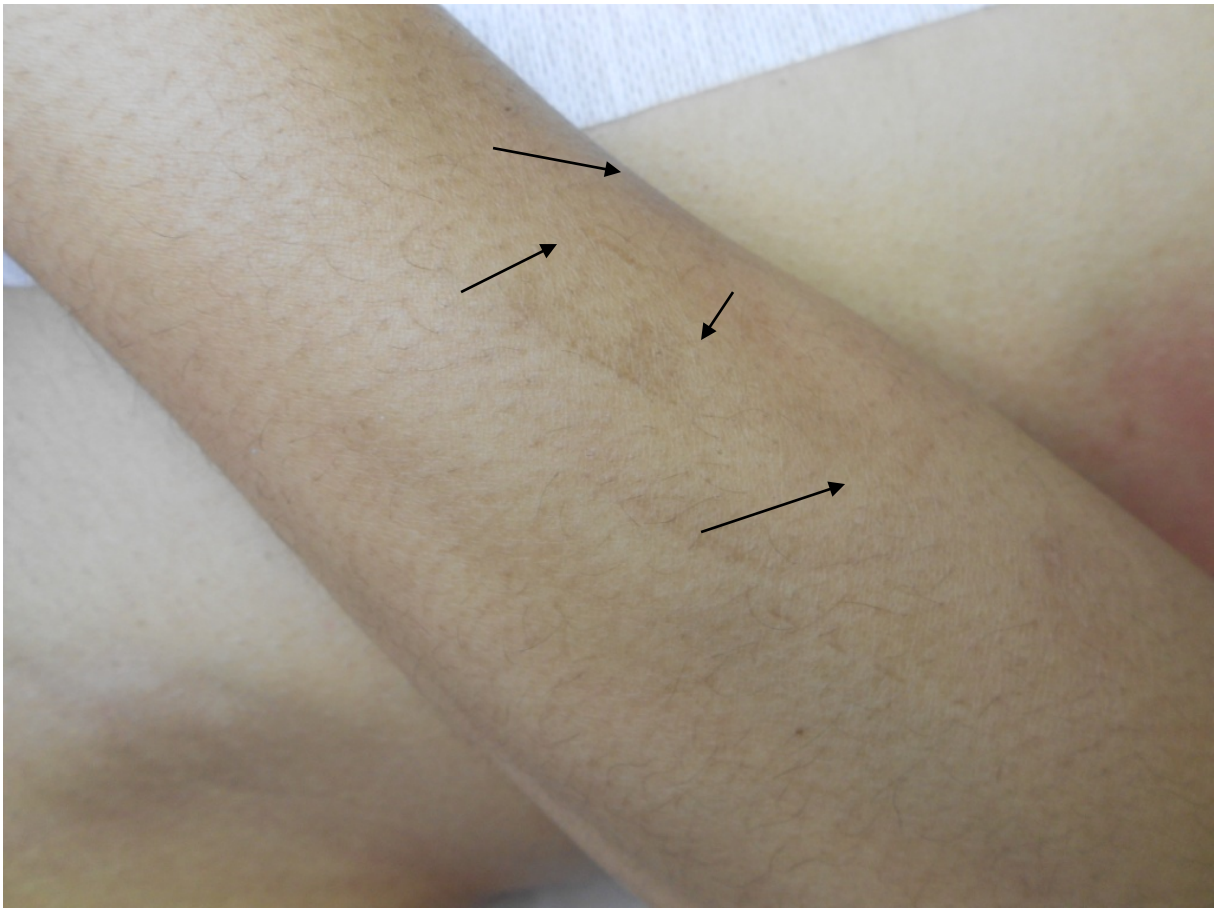

Figure 60: Person J-Scarring on left arm

4.7.11 Person K

Person K was a 30 year old White female individual whose chosen method of suicide was toxicity of ingested substance. This individual had very deep self-mutilation scars on her arms (Figure 61 and 62) as well as scarring, incised wounds and scratches (nails) on her abdomen (Figure 63 and 64), arms (Figure 65 and 66) and legs. The scarring on this individual ranged between 2 and 6 months old based on the colour and raising of the scars. Some of the scars were also older than 6 months old as these were white in colour and contracted. The incised wounds and scratches were created prior to committing suicide.

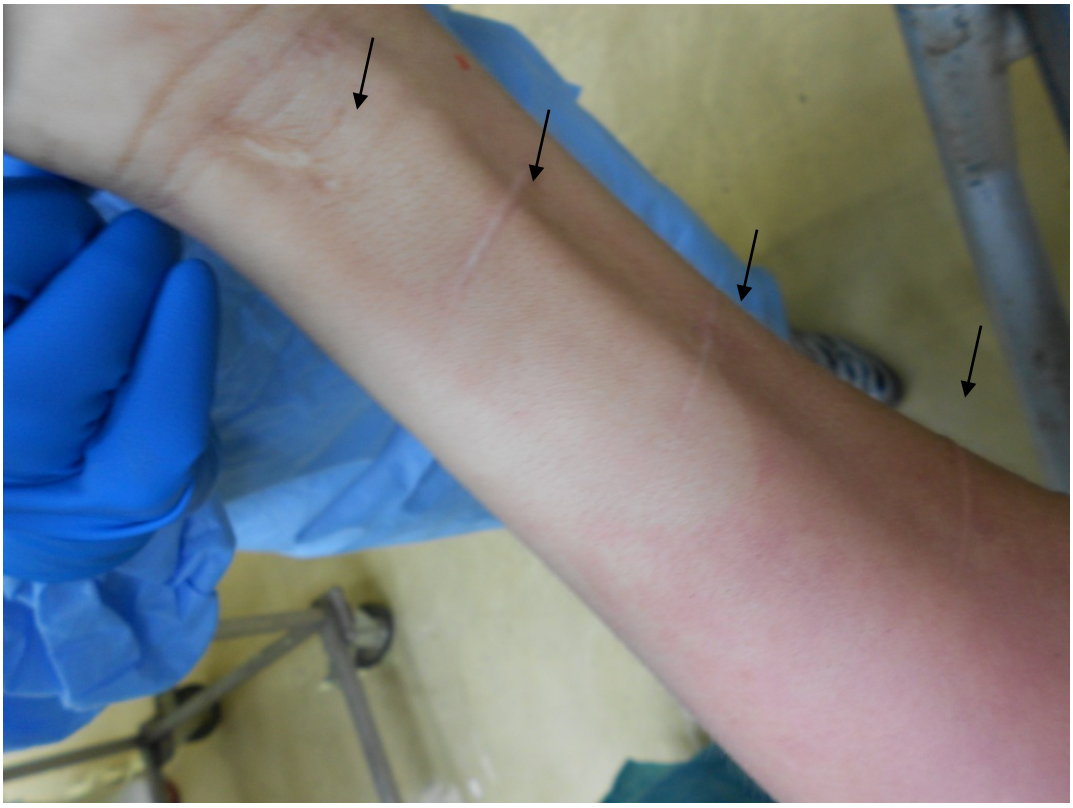

Figure 61: Person K-Scars on inner arm

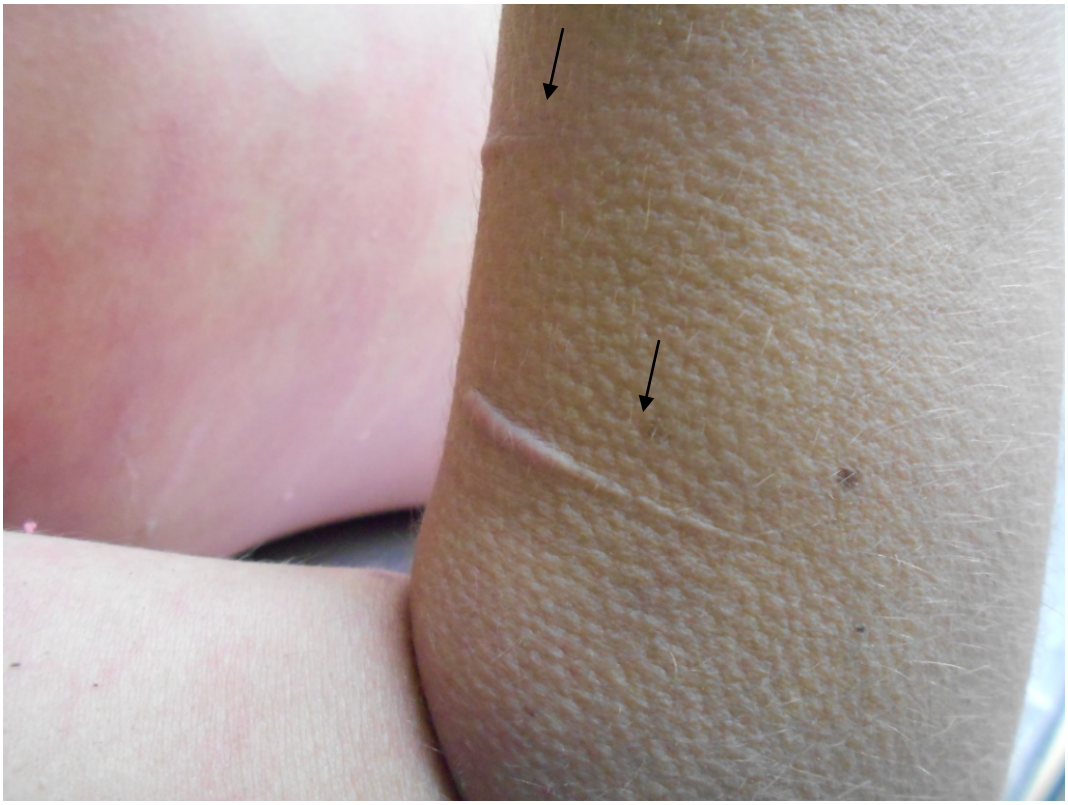

Figure 62: Person K-Scarring on outer arm



Figure 63: Person K- Superficial incisions on abdomen



Figure 64: Person K- Superficial incisions on top of abdomen

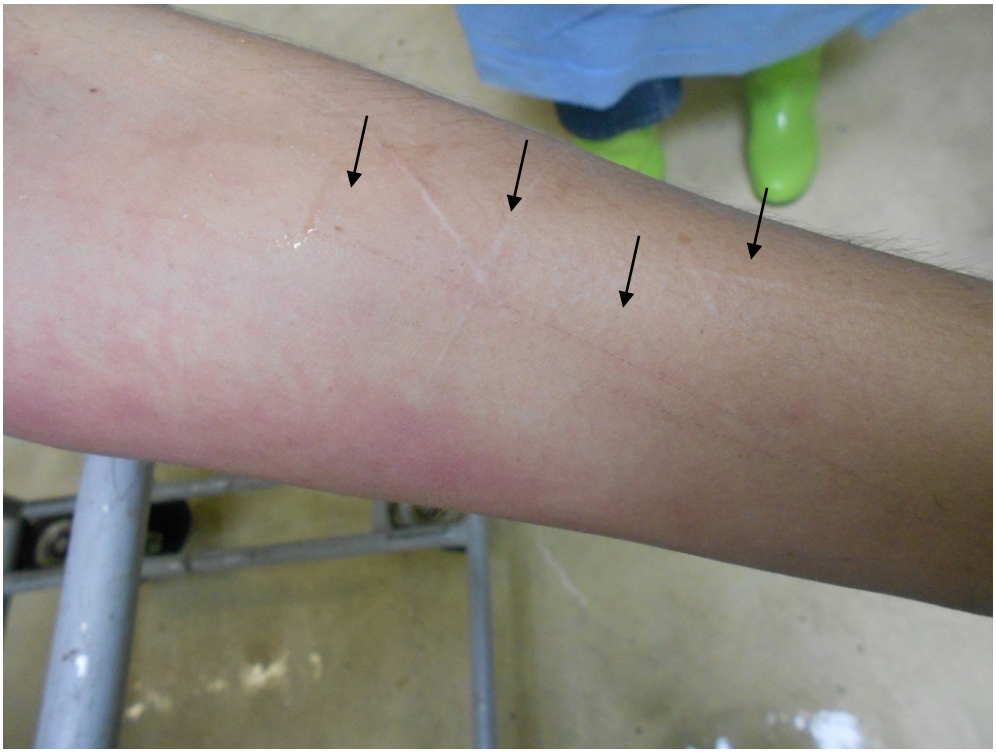

Figure 65: Person K- Scarring on inner arm

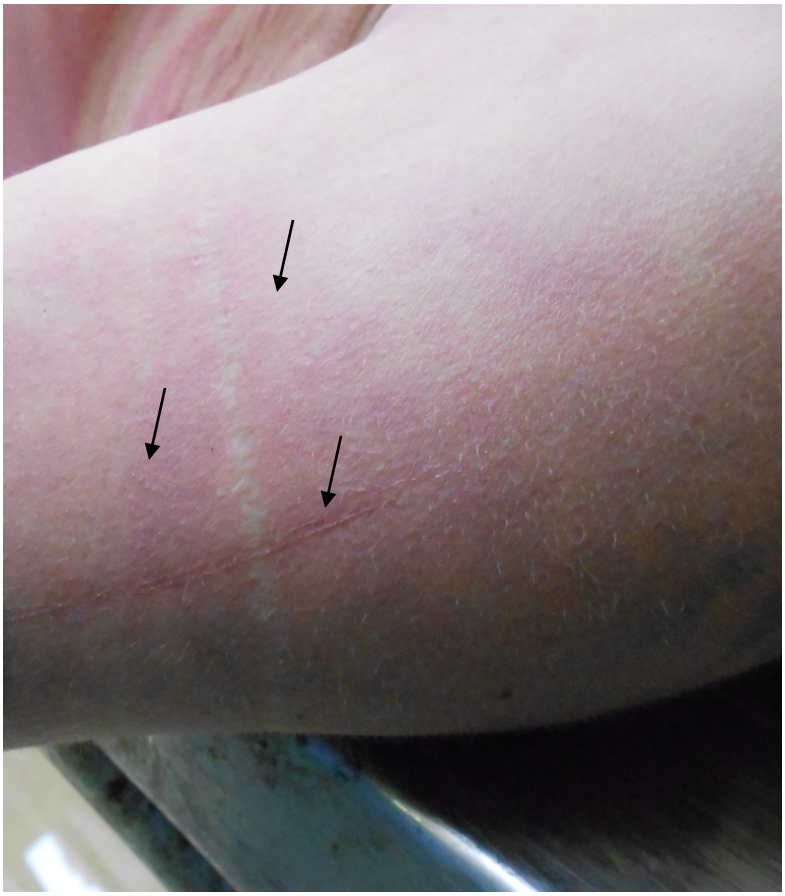

Figure 66: Person K-Scarring on upper arm

4.8 CONCLUSION OF RESULTS

The results section has highlighted the trends seen between the demographics of the individual in terms of the method of suicide as well as in terms of the self-mutilation sample. The trends noted in each pattern of injury in relation to method of suicide has also been highlighted and this indicates how certain external patterns of injury are more common in certain methods of suicide. These results will be considered in the following discussion section in terms of the available literature.

Chapter 5: Discussion

The following section will consider the trends noted in the results section and will consider these results in terms of the available literature

5.1 SUMMARY OF RESULTS

The results from this study considered the studies suicide population as a whole as well as the self-mutilation sample seen within this population. With regards to the entire suicide population, 35% (51/145) of the individuals were between the ages of 18 and 28 years, 76% (110/145) were male and 48% (70/145) were Black. The most common age range seen in this study was the 18 to 28 year age range with 36% (23/64) of the sample comprising hangings, 35% (14/40) comprising toxicity of ingested substance related suicides, 60% (3/5) comprising carbon monoxide related suicides and finally 33% (3/9) multiple methods within this 18- 28 years age range. Firearm related suicides fell into a much older age range of 49 to 58 years and was seen in 47% (7/15) of the overall suicide sample.

The most common sex noted in this study was male (76%, 110/145). Of the hanging cases received, 87% (56/64) were male individuals, 53% (21/40) of toxicity of ingested substance related suicides were also male, as was 100% (5/5) of the carbon monoxide related suicides and 88% (8/9) multiple methods of suicide. Of the firearm related suicides, 67% (10 out of 15) were male and 83% (10/12) of jump from height related suicides were also male.

NIMSS (2010) indicated that Black individuals are more likely to commit suicide in Gauteng than any other population group. This was seen in this study with 48% (70/145)

of the overall suicide sample being Black. However, certain population groups were more commonly seen in different methods of suicide even though the sample was mostly comprised of Black individuals. This is evident in that hanging was the most common method of suicide in the sample (44%, 64/145) and 59% (38/64) of these hanging cases involved Black deceased individuals. It was however, more common to see White individuals using toxicity of ingested substance related suicide (55%, 22/40), carbon monoxide related suicide (80%, 4/5) and multiple methods of suicide (56%, 5 /9) and a firearm (53%, 8/15) as their chosen method of suicide.

The results from this study have highlighted that there are individuals autopsied at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary who have engaged in self-mutilation in their past as well as prior to committing suicide. The results from this study concluded 145 cases of suicide, 11 of which exhibited a history of self-mutilation (8%). All of the self-mutilation cases presented with self-mutilative scarring, with 27% (3/11) of the sample presenting with unhealed cutting as well as scarring. It was also noted in the results that those with a history of self-mutilation were mostly White (91%, 10/11) and male (64%, 7/11) individuals.

This study found that the sites of election for self-mutilation seen in the cases at Johannesburg Forensic Pathology Service included the upper and lower extremities (82%) and abdomen (18%). The regions of the upper and lower extremities which revealed evidence of self-mutilation included the arms, armpits, thighs and calves. Scarring was also noted on the wrists of five out of the eleven self-mutilation cases. Of the 11 self-mutilation cases, only 5 cases displayed self-mutilation to their arms and wrists. However, 4 out of the 11 cases displayed self-mutilation to their thighs, arms and

wrists. Furthermore, 2 out of the 11 cases exhibited self-mutilation to their thighs, arms and abdomen. The 2 individuals with self-mutilation to their extremities as well as abdomen (Person I and Person K) also displayed evidence of nail marks and/or scratching to the skin made by nails.

The most common method of suicide in the self-mutilation sample was toxicity of ingested substance related (55%, 6/11) and was more often seen in females. The males in the sample used other methods of suicide which are higher in lethality such as hanging (18%, 2/11), carbon monoxide related suicide (9%, 1/11) and hanging/ toxicity of ingested substance as a multiple method of suicide (9%, 1/11).

The results from this study revealed that all the self-mutilating individuals had used cutting as their chosen method of self-mutilation. Only one of the cases from this study exhibited both cutting and burning (Person C) and this was noted in a male individual.

5.2 SUICIDE IN THE STUDY POPULATION

The entire suicide population will be discussed here in terms of the demographics, methods of suicide and external of patterns of injury. This discussion on this aspect of the results will attempt to understand the findings of this research in terms of the available literature.

5.2.1 Demographics of the suicide population

The results from this study coincide with the findings from Burrows and Laflamme (2006) and the NIMSS (2010; 2011) reports that suicide was seen to be more common in Black males between the ages of 25 and 29 (17.8%). It could be suggested that more Black

individuals were seen in the sample as Black individuals make up the majority of the South African population. The Census of 2011 (www.statssa.gov.za) has indicated that the South African population consists of 79.6% of Black individuals and this may explain why more Black individuals are seen in the suicide sample. Langhinrichsen-Rohling et al. (2009) have indicated that the higher numbers of Black individuals in the United States committing suicide may be due to racism and lack of support. Research considering why members of the Black population are at a great risk for committing suicide in South Africa is under researched. Research considering why certain population groups in South Africa commit suicide, as well as the methods of suicide chosen by certain population groups needs to be further evaluated.

South African data by Burrows and Laflamme (2006) and the NIMSS (2010; 2011) reported that younger Black individuals are more likely to commit suicide whereas older White individuals are more likely to commit suicide. The results from this study indicated that the sample mostly comprised Black individuals who fell into the 18 to 28 year age range. In addition, irrespective of race, this study revealed that suicide was more common in the younger age group of 18 to 28 and that hangings and jump from height related suicides were more commonly seen in Black individuals.

It was also noted that firearm related suicides were committed by mostly White males and these individuals fell into the older age range of 49 to 58 years old. It may be suggested that firearm related suicides are more common in older individuals as these individuals may have had possession of firearms before the newest gun laws came into effect. The amendments to the Firearm Control Act 60 of 2000 has made it more difficult to become a licensed firearm owner, and individuals wishing to own a firearm

need to qualify for these weapons in terms of the Firearm Control Act 60 of 2000. Any individual wishing to own a firearm needs to be deemed competent to do so and may be required to qualify in various categories, such as hunting and or sport shooting. Background checks and inspection of the individual's premises is also a deciding factor in terms of firearm ownership (Firearm Control Act 60 0f 2000). These laws may therefore make it more difficult for individuals to be in possession of a firearm. Blumenthal (2007) has indicated that the majority of those choosing a firearm as their method of suicide in South Africa were mostly male (82%) and White (63%) and this coincides with the results seen in this study regarding firearm related suicides. Blumenthal (2007) however notes, that those using a firearm as their chosen method of suicide fell into the 21 to 40 year age range. This differs from this study in that the majority of those who had used a firearm as their chosen method of suicide where older than 40 and fell into the 49 to 58 age range.

The majority of the sample committing suicide in this study were male individuals (76%, 110/145). Similarly, the NIMSS reports (2010, 2011) as well as Burrows and Laflamme (2006) and Scribante et al. (2004) indicated that male individuals commit suicide more often than females. The reason for there being higher numbers of male individuals in the suicide sample of this study and the other studies may be related to men using methods of suicide which are higher in lethality and therefore more likely to be successful and complete the suicide (Skegg, 2005; Wenar & Kerig, 2010). This trend of suicides being predominant in male individuals doesn't necessarily indicate that females are attempting suicide less than males, but that female suicide attempts are possibly less successful. It has been suggested by Kalat (2007) that females are more inclined towards suicide methods which are low in lethality as these methods tend to be less aggressive and that

males choose more aggressive methods of suicide (high lethality) as this speaks to an innate aggression within men (Kalat, 2007).

5.2.2 Method of suicide seen in the suicide population

Hanging was listed as the most common method of suicide in Gauteng according to the NIMSS report (2010) and Burrows and Laflamme (2006) and similarly, it was also noted in this study that hanging was the most common form of suicide (44%, 64/145) in the overall sample. Scribante et al. (2004) also indicated that the most common method of suicide within the Black population is hanging. The NIMSS report (2010) also indicated that firearm related suicides are the next most common method of suicide after hangings, and that toxicity of ingested substance related suicides are the third most common method of suicide. The results from this study however indicated that toxicity of ingested substance related suicides (28%) were the second most common method after hangings, followed by firearm related suicides (10%). See Table 2 to follow.

Research considering why certain methods of suicide are more prevalent than others appears to have gone unconsidered as well as why certain population groups would choose certain methods of suicide over others. It could be postulated that hanging is the most common method of suicide as the materials required to hang oneself such as rope, electrical cable and belts are common household and clothing items which most individuals would have access to.

Table 2: Three most common methods of suicide according to South African studies between 2004 and 2013

	Scribante et al., (2004)	**Burrows and Laflamme (2006)**	**NIMSS (2010, 2011)**	**Gobey (2013)**
Most common method of suicide	Firearm	Hanging	Hanging	Hanging
2nd most common method	Hanging	Firearm	Firearm	Toxicity of ingested substance
3rd most common method	Toxicity of ingested substance	Toxicity of ingested substance	Toxicity of ingested substance	Firearm

The reasons why certain population groups choose certain methods of suicide over others is unclear, and this lack of understanding in this particular area highlights an important area of future study. International studies have considered some cultural influences on suicide such as cultural and religious beliefs, family support, collectivism versus individualism and acceptability of suicide within the particular culture (Chu et al., 2010; Langhinrichsen-Rohling et al., 2009). Range et al. (1999) have indicated that African American individuals choose more violent lethal methods of suicide such as jump from height and firearm related suicides. Reason for why African American individuals choosing more violent lethal methods of suicide is uncertain. A similar trend is seen in South Africa, with Black individuals using jump from height as one of their more common methods of suicide. Individuals may also choose jump from height as their chosen method of suicide based upon where they work. It was seen that in two of

the twelve jump from height related suicides in this study; that these individuals had jumped from the building in which they worked.

In terms of multiple methods of suicide, Demirci et al. (2009) has suggested that a multiple method of suicide is used to ensure the success of the suicide. Multiple methods were most commonly seen in younger White individuals and there was often ingestion of a toxic substance involved. It was commonly seen that these individuals would ingest a substance such as prescription and/ or over-the-counter medications and would then hang themselves. Multiple methods of suicide were also commonly seen in male individuals and this again may relate to males choosing methods which are high in lethality. Multiple methods of suicide are used because they are usually high in lethality and will most likely be successful (Demirci et al., 2009).

5.2.3 External patterns of injury associated with method of suicide

Abrasions were the most common pattern of injury seen in the entire suicide population (55%, 80/145) and the majority of these abrasions were to the neck (49%, 71/145) in the form of friction ligature abrasions. Abrasions to the neck are consistent with hanging and this high number of abrasions to the neck is seen because the most common method of suicide seen was hanging. Friction abrasions often occur in hanging cases due to the ligature placing strain on the skin around the neck of the individual.

No external patterns of injury were seen in 27% (39/145) of the sample and this is because toxicity of ingested substance related suicides (28%, 40/145) were the most common method of suicide seen after hanging. The majority of the toxicity of ingested substance related suicide cases displayed no external patterns of injury because the

individual may have ingested a substance which will leave no external injury. Those who have injected themselves with a substance may present with needle puncture marks. No external patterns of injury were also seen in the carbon monoxide related suicide cases.

The most varied external of patterns of injury seen in this sample were seen in the jump from height suicides. This is due to the fact that when the individual jumps from a height they will often sustain multiple blunt force injuries. These individuals may also sustain sharp force injuries depending on whether they jumped through a window. Lacerations were the most common external pattern of injury noted in jump from height cases (92%). Abrasions were also commonly seen in 83% of the jump from height cases. The lacerations and abrasions seen in these cases were mostly to the extremities and the head. Injury to the extremities is common in jump from heights as the individual's legs and arms are usually the first object to break their fall. Head injuries are also common in these cases (Saukko & Knight, 2003).

Penetrating lacerations were seen in all of the firearm related suicides (15) which is consistent with injuries associated with the use of a firearm. The majority of the penetrating lacerations were seen to the head (93%, 14/15) whereas only one of the deceased individuals had shot themselves in the chest (7%). Blumenthal (2007) indicated that the preferred firearm used in firearm related suicides were handguns. This was also noted in this study with all of the firearm related suicides having been committed with handguns.

As was noted in the results section, Blumenthal (2007) indicated that the most common entrance point seen in firearm related suicides was the right temple region (41%)

followed by the mouth (18%) and then the left temple region (11%). These results coincide with the results seen in this study as 53% (8/15) of the firearm related suicides in this study had the entrance point at the right temple, 20% (3/15) had the entrance point in the mouth and finally 13% (2/15) had the entrance point from the firearm on the left temple. The other two firearm related suicides had their entrance points at either the chest (7%, 1/15) or the forehead (7%, 1/15).

5.3 SELF-MUTILATION IN THE SUICIDE POPULATION

Research has indicated that suicide and self-mutilation are separate phenomena, however engaging in self-mutilation can increase ones risk for committing suicide (Cooper et al., 2005; Harriss & Hawton, 2005; Klonsky et al., 2011; Muehlenkamp & Gutierrez, 2004; Rissanen et al., 2008). In addition, the psychopathologies and personality factors associated with suicide, such as depression and hopelessness are also seen in those engaging in self-mutilation. These factors may also play a role in increasing one's risk for suicide (Evren & Evren, 2005; Hilt et al., 2008).

Bergen et al. (2012); Hendershot et al. (2009) and Whitlock and Knox (2007) have also indicated that the strongest predictor of suicide in those engaging in self-mutilation is noted when the frequency of the self-mutilation is increased and repeated over time. It was seen in the cases within the self-mutilation sample that the self-mutilation had been repeated over time, and this was especially evident in the ageing of the scarring. While scarring is difficult to age, it was however indicated to the researcher by the Forensic Pathologists involved with these cases that some of the scarring seen in this sample was older than 6 months whereas some of the scarring was noted to be between 2 and 6 months old, and some scarring was less than 2 months old. This evidence of

prolonged self-mutilation on all of the cases indicates that repetitive self-mutilation may indeed be a risk factor for suicide.

It is interesting to note that the individuals who showed both scarring and unhealed cutting (27%) (3/11) were female individuals, which suggests that male individuals tend to cease the self-mutilating behavior with enough time for their wounds to heal before committing suicide. Research considering why females are more likely to self-mutilate shortly prior to committing suicide needs to be evaluated in future research. Future studies should also consider why males cease self-mutilation long enough for their wounds to heal prior to them committing suicide. Research considering this could be helpful in pinpointing gender specific suicide risk factors in those engaging in self-mutilation.

5.3.1 Demographics of those engaging in self-mutilation

Guertin et al. (2001) and Klonsky (2007) noted that self-mutilation is mostly seen in American White females between the ages of 14 and 24 years. Hicks and Hinck (2008) have also indicated that self-mutilation is most common within the White population. It was also seen in this study that the majority of those engaging in self-mutilation were White (91%, 10/11) and mostly between the ages of 18 to 28 years (55%, 6/11). It is however noted that the gender of those in this study, who had a history of self-mutilation, were mostly males, which differs from the findings of Guertin et al. (2001) and Klonsky (2007). It could be argued that more male self-mutilators (64%, 7/11) were seen in this study because males tend to choose suicide methods which are high in lethality (Skegg, 2005; & Wenar & Kerig, 2010) therefore, those males who have self-mutilated will choose a suicide method which is more likely to be successful and will therefore be

seen in the Forensic Pathology Service Medico-Legal Mortuaries. Female self-mutilators may in fact be suicidal, but research has indicated that they are more likely to choose methods which are low in lethality and will often survive the suicide attempt, as is seen in many overdose related attempted suicides. This suggests that female self-mutilators may in fact be suicidal and engaging in suicidal behaviour, however the low lethality of their chosen method does not result in success.

5.3.2 Methods of self-mutilation

According to Matsumoto et al. (2005) the most common form of self-mutilation is cutting, followed by cutting and burning in combination. Matsumoto et al. (2005) have suggested that cutting is more commonly seen in females, whilst cutting and burning in combination is more often seen in males. Only one of the cases from this study exhibited both cutting and burning (Person C) and this individual was male, which coincides with Matsumoto et al's. (2005) findings. It is unclear in the literature why females would be more likely to use cutting whereas males are seen to use cutting and burning together as their chosen method of self-mutilation. The type and method of self-mutilation chosen in terms of the sex of the individual should be considered in future research as this will perhaps shed light on why females and males differ in terms of their method of self-mutilation.

Hicks and Hinck (2008) commented that some self-mutilators will use finger nails to inflict damage as opposed to other objects such as knives, scissors, glass, paper clips and broken plastic from pens. It was noted in the results that two out of the eleven self-mutilators (Person I and K) had in fact used finger nails as an instrument with which to inflict the damage. This was seen in the form of forcing the nail into the skin as well as using the nail/s to scratch the skin. Despite the two cases that had shown use of nail/s

as a method to self-mutilate, the majority of the self-mutilation wounds seen were incised wounds which suggested that a sharp object like a knife, razor blade or scissors were potentially used. The use of sharp objects like blades may be preferred as it would be easier to inflict damage with a sharper object than with a blunt object. It could also be suggested that most individuals would have access to sharp objects such as knives, scissors and blades as these are common household items and therefore easily accessible.

Austin and Byard (2013) have considered how individuals will write suicide notes on their skin with pens and markers. Research hasn't considered how one may 'write' a suicide note on their skin in the form of self-mutilative cutting. It was seen on Person E that this individual had 'written' the words "I hate life" on their arm prior to committing suicide and this is an indication of the individuals thoughts prior to death. This individual had left the message "I hate life" on her arm by cutting it into the skin, thereby leaving a final testament to be viewed by the living.

5.3.3 Sites of election associated with self-mutilation

With regards to the sites of election for self-mutilation Hicks and Hinck (2008) have indicated that these sites of election include the wrists, armpits, arms, thighs, ankles, feet, and abdomen and panty line. These regions are often preferred over others because they are easily hidden and more sensitive. It was seen in the results that the sites of election coincide with Hicks and Hinck's (2008) preferential regions being the upper and lower extremities as well as the abdomen. Incisions made to the abdomen prior to committing suicide were seen in two of the female cases in the self-mutilation sample.

In terms of scarring on the wrists it was noted in the results section that this scarring on the wrists may be indicative of a previous suicide attempt; however, it may have also been self-mutilation scarring as research has found that some individuals will self-mutilate their wrists without suicidal intent (Hicks & Hinck, 2008). It is therefore difficult to establish whether the self-mutilation seen on the wrists was due to a previous suicide attempt or self-mutilation, it is still however worth noting that it may have been a result of either behaviour.

Hicks and Hinck (2008; 2009) have also indicated that some individuals will self-mutilate only one region of their body, whilst others will self-mutilate on a variety of regions. The majority of the cases noted in this study only displayed self-mutilation to the upper and lower extremities (82%, 9/11) whilst some had mutilated the upper extremities, lower extremities as well as the abdomen (18%, 2/11). An individual may self-mutilate certain regions in preference to others because of the sensitivity of that region as well as the fact that regions such as the abdomen are easily hidden (Hicks & Hinck, 2008). It could be argued that an individual may self-mutilate one region, such as the upper extremities in the earlier stages of self-mutilation and that they may then move to other regions such as the lower extremities and abdomen as the self-mutilation progresses. This may be because they may “run” out of space on a particular region of the body, as it has also been suggested that the self-mutilation eventually doesn’t achieve the desired effect anymore and that moving to a new region of the body may solve this problem (Hicks and Hinck, 2008; 2009).

5.4 CONCLUSION OF DISCUSSION

The discussion of the results has indicated that self-mutilation is prevalent in 8 % of the suicide population received at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary over an eight month period. The sites of election noted in this study are similar to those seen in international literature as well as the method of cutting being the most common form of self-mutilation. The self-mutilation is also most common in the White population which corresponds with a variety of literature on the topic. The self-mutilation was also more prevalent in male individuals and this may be indicative of the fact that males choose methods of suicide which tend to be more successful. The self-mutilation analysis on these cases provides supporting evidence for having been repeated events over at least 6 months and this may indicate that prolonged usage of self-mutilation may be a risk factor for suicide.

Chapter 6: Limitations and future recommendations

The following section will consider limitations and future recommendations. The limitations experienced with this research will also be highlighted and the impact that these limitations had on the research will be considered. Future recommendations will also be mentioned as it is important to consider how this dissertation has noted other potential future research possibilities, and also how this research hopes to improve the collection of self-mutilation related statistics in Forensic Pathology environments.

6.1 LIMITATIONS

The lack of prevalence statistics on self-mutilation in South Africa was problematic throughout the conducting of this dissertation. These statistics would have aided the researcher in understanding what patterns have been seen with regards to this phenomena in the South African context. In addition, South African statistics on self-mutilation and its link with suicide would have allowed for an improved interpretation of the results. This study was also exploratory in nature, thus highlighting the lack of other studies considering self-mutilation in a suicide population. The discussion section could therefore only consider self-mutilation seen at the Johannesburg Forensic Pathology Service in terms of international trends on living populations, which may not be an accurate reflection of self-mutilation and suicide in the South African context. Self-mutilation may be less prevalent in the South African context due to our population being made up of a majority of Black Individuals and research has indicated that Black individuals are the least likely population group to engage in self-mutilation (Klonsky, 2007; Rissanen et al., 2008).

Some limitations experienced with regards to finding case files at the Johannesburg Forensic Pathology Service Medico-Legal Mortuary were experienced. These limitations included, inter alia the following aspects:

1. Some case files were misplaced by the Johannesburg Forensic Pathology Service, perhaps due to access by various officials, resulting in delays with regards to the collection of important data relating to age, cause of death and specific post-mortem reports.

2. In some instances, cases could not be accessed due to files being temporarily unavailable as a result of the Forensic Pathologists having taken leave prior to the completion of the report.

3. Forensic Pathologists relocating to other facilities and not being readily available to comment on cases handled by them posed further difficulties in terms of case file collection.

One of the cases was excluded due to the fact that the documentation could not be located in its entirety. The case was a homicide-suicide case, in which the wife had shot her husband and then herself. The mortuary file relating to the homicide aspect could be located but not the file relating to the suicide. Reasons for this particular case file having been misplaced were not available to the researcher. The researcher attempted to locate this file for three months before deciding to exclude the case.

Another case was excluded as it had been incorrectly identified as a suicide case on the SAP 180 document. The researcher attended the post-mortem procedure and it was

deduced at medico-legal autopsy by the Forensic Pathologist on duty that the case appeared to be accidental rather than suicidal.

Other difficulties experienced with data collection involved the photography taken of self-mutilation. Poor lighting in the medico-legal autopsy suite and light “flooding” from the camera’s flash posed some more difficulties in that the pictures were often too bright such that the scarring was not visible on the photograph. The researcher discovered later on during the data collection process that using the ‘red eye’ function on the camera improved the photography as it supplied enough light to see the scarring but not so much that it flooded out the picture. Some of the scarring was also very pale, and even though evident to the naked eye, was not visible in the photographs. In addition, postmortem changes posed further complications in terms of the photography. After death, the body begins to change colour which is referred to as livor mortis (Saukko & Knight, 2003). The livor mortis causes the body to develop a pink, purple or mottled tone. This livor mortis or lividity occurs due to “cessation of the circulation and the relaxation of the muscular tone” (Shepherd, 2003, p. 39). This allows the blood and fluid within the body to “settle” in certain regions of the body due to gravity and therefore results in the pinkish effect seen on the skin of the deceased. The eventual coagulation of the blood will also result in the mottled effect seen on the skin, and this is sometimes referred to as “marbling”.

Furthermore, the small self-mutilation sample could not have been foreseen by the researcher as this research is exploratory in nature, and therefore no reference point was available for the researcher to predict what the final sample size would have been.

6.2 FUTURE RECOMMENDATIONS

It is clear that there are very large areas in the research which haven't been considered and which require future consideration. This is particularly problematic in that we need a full understanding of the act of self-mutilation in order to assist those who suffer from this behaviour and reduce their risk of suicide. Because we do not have a complete understanding of self-mutilation, we haven't been able to fully understand its aetiology, nor have we been able to develop an effective treatment for it. In addition, the information on the psychological role of scars in self-mutilating behaviour is lacking, as well as the role that these scars play in the future of the individual.

Furthermore, there is a lack of understanding with regards to self-mutilation within the South African context due to the shortage of prevalence statistics. It is evident, based on international literature that the numbers of those engaging in self-mutilating behaviour is increasing, as well as the effect this has on suicide. These gaps in the research need to be filled such that we can attempt to stop the rise of this phenomenon and its damaging effects.

This research has indicated that self-mutilation is seldom noted on medico-legal autopsy reports despite Forensic Pathologists noting procedure related scars for identification purposes. It is unclear as to why these self-mutilative scars are not identified as these scars can serve an important role in determining whether the cause of death was suicidal, homicidal or accidental. This research will hopefully highlight the need for noting self-mutilation scarring and unhealed self-mutilation on medico-legal autopsy reports so that we may start to analyse these results and create prevalence statistics for self-mutilation in the South African context, thereby indicating whether self-mutilation is

more common in South Africa than previously thought. This will also indicate how many of those individuals engaging in self-mutilation eventually commit suicide as well as the demographics of those individuals, indicating which individuals are at greater risk. It will also improve the efficacy of determining whether the case was indeed suicidal. Out of the 11 self-mutilation cases collected for this research, only two had their self-mutilation noted in the medico-legal autopsy report, thus highlighting the need for greater understanding of self-mutilation, as well as the importance of noting self-mutilation on medico-legal autopsy reports. The self-mutilation which was noted on the medico-legal autopsy reports were two of the cases where the self-mutilation was unhealed. Self-mutilative scarring was not noted on the post-mortem reports, It could be argued that Forensic Pathologists perhaps require further training with regards to understanding phenomena such as self-mutilation as well as the importance of noting these scars on medico-legal autopsy reports. The importance of noting these scars from a prevalence statistics perspective as well as in terms of case finalisation should be incorporated into the training of Forensic Pathologists and other medical professionals.

It is hoped by the researcher that this research can be disseminated to those within the medical profession so as to increase their understanding of self-mutilation and its potential link with suicide. Medical practioners may be aware of self-mutilation on their patients but disregard it due to the false belief that those who self-mutilate never commit suicide. Hopefully, this research will highlight that there is a potential risk for suicide in those who have self-mutilated and that medical practioners will be more inclined to refer their patients onto mental health workers for assessment and treatment.

A study similar to this researching self-mutilation in the suicide populations at other Forensic Pathology Service Medico-Legal Mortuaries across South Africa could be valuable in that it could consider whether self-mutilation is seen in certain locations or regions as opposed to others at a similar or different variance. Similarly, comparisons between the suicide population as well as individuals who self-mutilate and who have attempted suicide could be made using an in-patient population.

Research considering why certain population groups would choose particular methods of suicide over others is something which needs to be considered. This research noted trends with regards to certain population groups preferring certain suicide methods over others, but no explanation for this could be found. This requires consideration for future study to determine whether these results are consistent in other urban and rural areas.

As was seen in the results section, the study comprised mostly male suicides. These trends with male individuals successfully committing suicide more so than female individuals is noted in the NIMSS reports (2010; 2011) as well as in a range of other studies mentioned throughout this research. It may therefore be important to conduct studies which consider how many females have attempted suicide in South Africa, as this will give an indication of the level of suicidality in the female population. A study considering suicide attempts in females could also collect information regarding self-mutilation in the female population, thereby highlighting which females have self-mutilated and are at a greater risk for completing suicide.

Chapter 7: Conclusion

It is evident that self-mutilation is present in the suicide population received at the Johannesburg Forensic Pathology Service. The numbers of those engaging in self-mutilation appear to be less than that noted in international studies, however, it is important to consider this phenomenon in terms of suicide all the same. This is necessary in that it will allow us to identify which individuals who self-mutilate are at the greatest risk for suicide, thus allowing us to employ preventative measures to reduce the damaging effects of self-mutilation and its potential for suicide.

Training regarding self-mutilation should be improved on within the medical field. This will allow medical professionals to be fully aware of the risks associated with self-mutilation and this may in turn reduce the risk of those self-mutilating individuals from committing suicide. This improved training would also allow Forensic Pathologists to be aware of the importance of noting self-mutilation on medico-legal autopsy reports so that a profile of the “at risk” individual can be created and this may eventually go on to aiding medical and mental health practioners in assessing which of their self-mutilating patients and/ or clients are at an increased risk for suicide.

Noting self-mutilation on medico-legal autopsy reports will allow us to develop more accurate prevalence knowledge of self-mutilation within the South African context and this in turn can improve the efficacy of finalizing cases where it was uncertain as to whether the death was suicidal, accidental or homicidal.

“We turn to the body because it cannot be denied. We get old, we die, we disintegrate into dust, but our living bodies are proof of our here-and-now existence in a world that is too often numb and confusing” (Hewitt, 1997, pp.20-21).

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Appendix

Appendix 1

ETHICAL CLEARANCE CERTIFICATE

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Ms Erin C Gobey

CLEARANCE CERTIFICATE	**M110503**
PROJECT	Prevalence of Self-Mutilation seen in the Cases of Suicide Cases at the Johannesburg Pathology Services
INVESTIGATORS	Ms Erin C Gobey.
DEPARTMENT	Forensic Medicine/School of Pathology
DATE CONSIDERED	25/05/2012
+DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 25/05/2012 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr G Gordon

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Appendix 2

DATA SHEET

Documentation of suicidal and self-mutilation injuries (Gobey 2012 and FPS JHB)

Case Number: _____ Date of Autopsy: _____

Date of Death: _____ Age at Death: _____

Ancestry: _____ (B/W/C/I/?) Sex: _____ (M/F)

Name of Doctor: _____ Date of Analysis: _____

1. Description of "circumstance" of death

☐ Carbon monoxide ☐ PVA ☐ Jump from height

☐ Hanging ☐ Burns ☐ Drowning/asphyxia

☐ Toxicity of ingested substance ☐ Firearm related ☐ Multiple method of suicide

☐ Other……

2. External appearance of affected region:

☐ No visible soft tissue injuries

☐ Visible soft tissue injuries:

☐ Abrasions ☐ Lacerations ☐ Incised wounds

☐ Scarring ☐ Penetrating Wounds

3. Region and Description of Suicide Related Injuries

☐Head

……..

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☐Neck

……..

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☐Anterior Chest

……..

…..……

☐ Posterior Chest

……..

…..……

☐ Anterior Abdomen

……..……

…..……

☐ Posterior Abdomen

……..……

…..……

☐ Anterior Pelvis

……..……

……..……

☐ Posterior Pelvis

……..……..……

……..…….

☐ Upper Extremity

……..…….

……..

☐ Lower Extremity

……..…….

……..

5: Presence of Self-Mutilation (If Applicable)

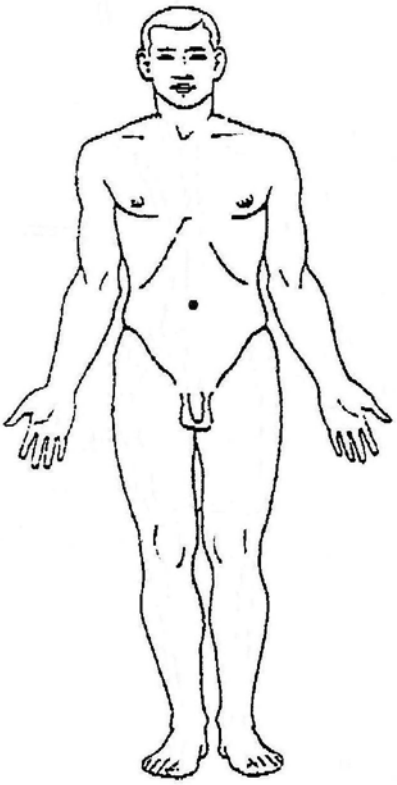
Type ☐ Incision ☐ Stab Wound

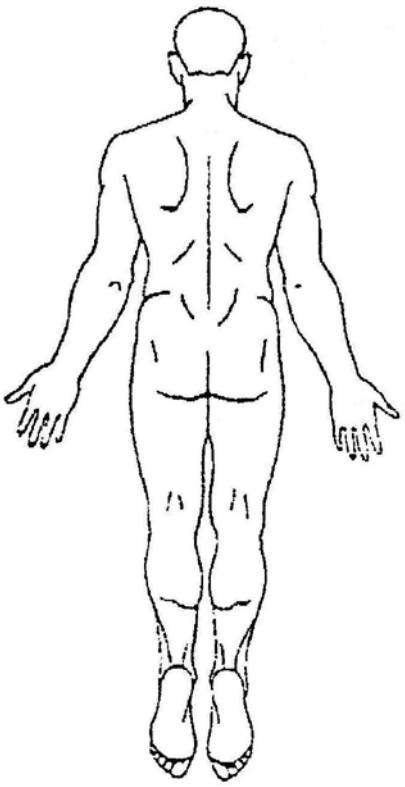
Location ☐ Upper Extremities ☐ Lower Extremities ☐Anterior Chest

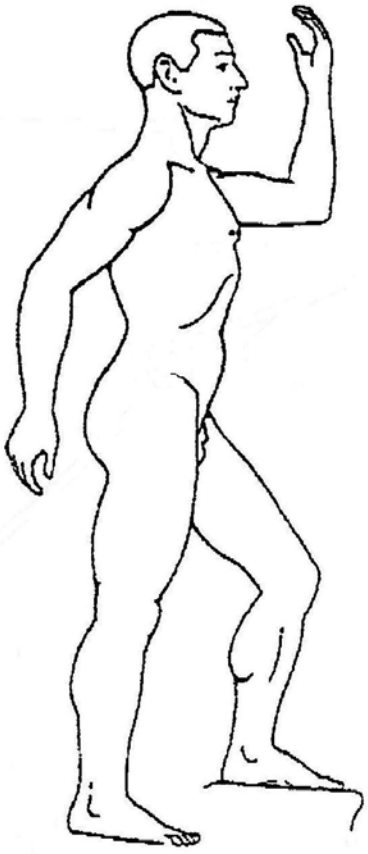
☐Anterior Abdomen ☐ Anterior Pelvis ☐

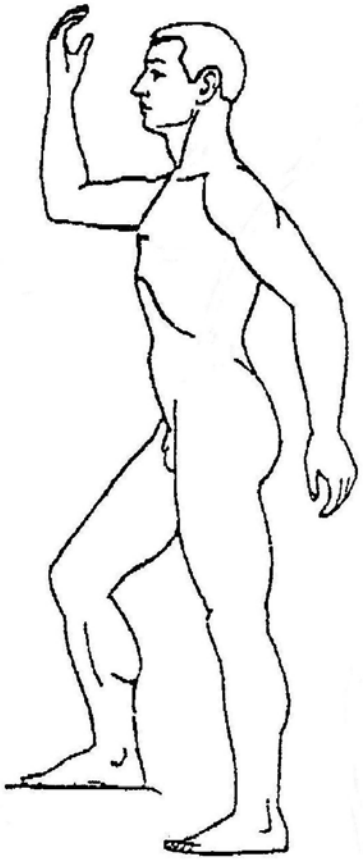
Single/ Multiple Wound ☐ Single ☐ Multiple

Unhealed Wound/ Scarring ☐ Unhealed Wound/s ☐ Scarring









Appendix 3

EXCEL SPREADSHEET EXAMPLE

Body #	Sex	Pop.Group	Age group	Method of Suicide	Wound Types	Region of Wound	Self-Mutilation Present	Scarring	Unhealed Cutting	