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THE DIFFERENCES BETWEEN DELIBERATE AND PRECAUTIONARY RISK TAKERS BASED ON THEIR ASSOCIATIONS WITH SENSATION SEEKING

by

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ABSTRACT

High risk sports participants are considered to be risk takers and sensation seekers. Populations of high risk sports athletes are often described as a homogenous risk taking group. As the results of this study have shown, risk taking attitudes vary amongst athletes within a single sport, and one cannot assume homogeneity amongst rock climbers. The research aimed to classify rock climbers as risk takers according to the Risk Taking Inventory and to assess whether they differ with regards to their associations with sensation seeking. A quantitative study, using an exploratory design was used to understand the risk taking groups and establish their relationship with sensation seeking. Rock climbers from the Mountain Club of South Africa and the City Rock gym in Randburg were invited to participate in the research and a final sample size of 70 research participants was obtained. The participants completed a set of assessment measures including a demographic questionnaire, the Risk Taking Inventory and the Sensation Seeking Scale-V. Non-parametric statistics were conducted and the results revealed that the rock climbers could be divided into two risk taking groups, namely Deliberate Risk Takers and Precautionary Risk Takers. Statistically significant differences were found between the two risk taking groups on the Sensation Seeking Scale-V scale and its subscales. Both groups showed strong positive correlations between the Total Sensation Seeking Scale and three of the subscales, including Experience Seeking, Disinhibition and Boredom Susceptibility. Future studies should take into account regional variances and explore the differences between the sub-disciplines of rock climbing and assess whether they differ on the Risk Taking Inventory and their associations with sensation seeking.

Key terms: risk taking, sensation seeking, rock climbing, deliberate risk taking, Deliberate Risk Takers, precautionary behaviour, Precautionary Risk Takers, Total Sensation Seeking Scale, Thrill and Adventure Seeking, Experience Seeking, Disinhibition, Boredom Susceptibility

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Risk taking behaviour was once deemed necessary for the survival of hunting-gathering societies. People had to explore new territories, seek out basic resources such as food and water, and potential mates, in order to survive. This exploratory behaviour was filled with many gains and risks, often physical in nature (Goma-i-Freixanet, 2004). Contemporary societies continue to take risks through exploratory behaviour, although the reasons for risk taking pervades the need for survival, and extends into the need to experience novelty, thrill and excitement. Risk taking permeates into the economic, legal, political and social spheres of life and not all risks are equally perilous or acceptable (Goma-i-Freixanet, 2004).

Unacceptable forms of seeking out sensation, novelty, excitement and risk include uninhibited parties, reckless driving, gambling, sexual encounters with multiple partners and illicit drug taking (Zuckerman, 1983). High risk sports are however classified as a socially acceptable form of risk taking and are defined as activities in which one has to accept the possibility of severe injury or death, and requires specialised equipment or skills to manage the potential risk (Breivik, 1991; Cazenave, Le Scanff & Woodman, 2007; Kupciw & MacGregor, 2012). As such, the athletes participating in high-risk sports intentionally take risks by participating in these hazardous activities and it is often assumed that they are both risk takers and high sensation seekers (Zuckerman, 2009).

The Outdoor Industry Foundation (2011) reported that participation rates for high risk sports such as rock climbing have increased by 25% over a four year period which has led to an increased number of injuries (Ewert, Gilbertson, Luo & Voight, 2013). The popularity of this sport nevertheless continues to increase (Haas & Meyers, 1995). In the United States of America, more than 9 million people participate in the sport annually (Nelson & McKenzie, 2009). Due to the increasing popularity of rock climbing and other high risk sports, it is important to understand what differentiates rock climbers in terms of the types of risks that they are willing to take.

1.2 Problem statement

High risk sports participants are defined as risk takers who voluntarily participate in activities that may lead to potential harm (Woodman, Barlow, Bandura, Hill, Kupciw & MacGregor, 2013). Some individuals are more likely to deliberately take additional risks when they engage in their respective sports, whereas others try to minimise the risks involved by engaging in precautionary behaviour (Llewellyn & Sanchez, 2008, Pain & Pain, 2005). A statement by Alex Lowe, a world-renowned mountaineer, clearly illustrates these approaches to risk taking:

> "*There's a fascination and an appeal in (mountaineering) a situation that's potentially risky, but rather than being a risk taker as such, I consider myself and my climbing peers to be risk controllers, and we just enjoy being in this situation and keeping risk at a reasonable level*" (Gutman & Frederick, 2003, p. 93).

Risk taking is not a homogenous term as previously accepted, and high risk sports athletes can either take on a deliberate risk taking or precautionary behaviour approach in their respective sports (Woodman et al., 2013). It is important to understand the types of risks that athletes take in high risk sports, as an understanding can aid in training initiatives and the development of safety equipment. Research on the topic of risk taking in high risk sports has been limited due to one dimensional and unvalidated assessment measures of risk taking attitudes and behaviour (Lafollie & Le Scanff, 2007). Woodman et al. (2013) however developed the Risk Taking Inventory (RTI) to predict risk associated outcomes in high risk sporting environments. This is considered to be the first validated assessment measure for the high risk sport environment and differentiates rock climbers as either Deliberate Risk Takers or Precautionary Behaviorists. Although many studies have focused on risk taking and sensation seeking amongst rock climbers, the focus has mainly been on injuries and accidents as well as other means of assessing risk taking (Fave, Bassi & Massimini, 2003; Llewellyn & Sanchez, 2008; Llewellyn, Sanchez, Asghar & Jones, 2008; Martha, Sanchez & Goma-i-Freixanet, 2009). No previous studies have made use of the Risk Taking Inventory to understand the types of risks rock climbers take and how the different groups of risk takers associate with sensation seeking constructs outlined in the Sensation Seeking Scale-V (SSS-V). This study therefore sets out to address the gap in the literature.

1.3 Research aims and objectives

The primary aim of the present study was to classify rock climbers as risk takers according to the Risk Taking Inventory and to assess whether they differ in terms of their associations with sensation seeking. The objectives of the study were therefore to:

- Determine whether rock climbers can be divided into the Deliberate Risk Taking or Precautionary Behaviour groups.
- Determine if there are any differences between the scores of the Sensation Seeking Scale-V subscales. In order to meet this objective, the following hypotheses were set:
    - H0: There are significant differences between the scores of the Sensation Seeking Scale-V subscales.
    - H1: There are no significant differences between the scores of the Sensation Seeking Scale-V subscales.
- Determine if there are any differences between the Deliberate Risk Taking group and the Precautionary Behaviour group with regards to their scores on the Sensation Seeking Scale-V subscales. In order to meet this objective, the following hypotheses were set:
    - H0: Deliberate Risk Taking and Precautionary Behaviour groups differ significantly with regards to the scores on the Sensation Seeking Scale-V constructs.
    - H1: Deliberate Risk Taking and Precautionary Behaviour groups do not differ significantly with regards to the scores on the Sensation Seeking Scale-V constructs.
- Determine if group status has an impact on the relationship between the subscales of the Sensation Seeking Scale-V. In order to meet this objective, the following hypotheses were set:
    - H0: Group status does impact on the relationship between the subscales of the Sensation Seeking Scale-V.
    - H1: Group status does not impact on the relationship between the subscales of the Sensation Seeking Scale-V.

1.4 Structure of the dissertation

Chapter 2 presents a comprehensive review of the literature related to risk taking, sensation seeking and rock climbing. The chapter commences with an explanation of risk taking and how the definition has changed over time. The discussion then moves to an overview of the reasons for participating in risk taking behaviour. A detailed review of risk taking in the sporting environment ensues. The discussion then focuses on Deliberate and Precautionary Risk Taking followed by an overview of sensation seeking. Lastly, the chapter looks at rock climbing as a high risk sport, and the prevalence of risk taking and sensation seeking in rock climbing.

In Chapter 3, the research methodology is unpacked. The research design and the sampling approach are discussed, followed by a description of the participants. The discussion then moves to the measurement instruments used in the current study. The data collection procedure, ethical considerations and analysis methods are then described.

In Chapter 4, the results of the data analysis are presented. The chapter focuses on the type of analysis conducted and provides an explanation of why these methods were the most appropriate fit to the data.

Chapter 5 provides an interpretation and discussion of the results found in Chapter 4. The results are interpreted in terms of the research problem and focuses on the literature reviewed in Chapter 2. The discussion is concluded with the limitations of the study and recommendations for future research.

1.5 Conclusion

This chapter provides readers with a framework and context for the current research study. The research problem was explained and the aims and objectives of the study were stated. The chapter concludes with an outline of the subsequent chapters. The literature review will now be presented in Chapter 2.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This literature review is divided into three main components. The first component of the review focuses on risk taking, its definition, the reasons for participating in risky activities as well as the different types of risk taking behaviours. The second component of the review clarifies the term sensation seeking and focuses on the prevalence of sensation seeking in high risk sport. The last aspect of the literature review is an exposition of rock climbing and how it is related to risk taking and sensation seeking behaviour.

Rock climbing is a progressive sport and participation rates continue to increase globally and in South Africa. It is considered an extreme sport which often attracts people who want to experience new or unusual sensations and risk. The roles that risk taking and sensation seeking play in socially acceptable forms of behaviour such as extreme sport and specifically rock climbing have been thoroughly examined in the literature, and alternative viewpoints around these roles have arisen. Many studies focusing on the physical component of risk taking have been undertaken. Fewer studies have focused on the psychological nature of risk taking in high risk sports such as rock climbing (Taylor, Gould, Hardy & Woodman, 2006). The reasons for participating in risky sport such as rock climbing and mountaineering are diverse and often irrational as outlined below:

> Some of the people who warned me against writing hastily had also cautioned me against going to Everest in the first place. There were many, many fine reasons not to go, but attempting to climb Everest is an intrinsically irrational act – a triumph of desire over sensibility. Any person who would seriously consider it is almost by definition beyond the sway of reasoned argument (Krakauer, 1997, p.xvii).

An excerpt from Krakauer (1997) clearly states that climbing Mount Everest was not a rational act. The reasons for taking such risks are multi-faceted and incomprehensible by many and participants of high risk sports are often grouped under the umbrella term, *risk takers*. There is however more to the picture as unpacked in the subsequent section.

2.2 Risk taking

2.2.1 Defining the term risk taking

Even until the 1990's the term risk had not been clearly defined, and was often used to refer to a sense of ambiguity and subjectivity (Wagner & Houlihan, 1994). When Yates and Stone (1992) decided to combine the notion of loss and risk, they defined risk as potential loss, significance of loss and uncertainty of loss. More than 20 years later, Taylor et al. (2006) operationalised the term risk to eliminate ambiguity and allow it to be measured quantitatively. They defined risk as: "the appraised likelihood of a negative consequence of behaviour, characterized by personal significance, an uncertain outcome, and the distinct possibility of loss" (Taylor et al., 2006, p. 16). In essence physical risk taking referred to potential threats to one's health, safety or well-being and the likelihood of a negative outcome embedded in the behaviour. This description of risk taking could be perceived as a broad description of Turner, McClure and Pirozzo's (2004) definition of risk taking. They referred to risk taking as the voluntary participation in activities that could result in injury or death. Cazenave et al. (2007) similarly defined risk taking behaviour as the voluntary self-investment in a situation that might lead to bodily (death or injury) or material damage; and a degree of threat, obstacles and traps that are considered to be dangerous. In addition risk taking entails three fundamental aspects which include personal premeditated choice; uncertainty, unpredictability, an element of chance; and the potentially negative outcomes of the event (Cazenave et al., 2007).

These definitions clearly show that although a person might be aware of the consequences of engaging in risky behaviour, they continue to display a desire for the irrational act, even if it appears to be "beyond the sway of reasoned argument" (Krakauer, 1997, p.xvii). These descriptions of risk further elucidate that risk taking behaviour not only refers to a conscious decision to participate in an event that might lead to adverse outcomes, but also that the outcome is unpredictable and might lead to material or bodily loss or damage.

Despite the possibility of a negative outcome, many people continually engage in risky activities as the extreme conditions found in illicit drug taking, fast driving and the participation in high risk sports for example, increase physiological arousal, pleasure and emotional intensity when engaging in these activities (Lyng, 2005; Zuckerman, 1979). There are many theories focusing on the factors that motivate risk taking behaviour, some of which will subsequently be outlined.

2.2.2 Reasons for participating in risk taking behaviour

2.2.2.1 Personal agency

The reasons for participating in high risk sport range from a need for thrill and excitement in ones' personal life, to personal agency, self-control and enhancement, emotional engagement and overcoming ones' fears (Woodman, Hardy, Barlow & Le Scanff, 2010; Zuckerman, 1983). Personal agency pertains to a feeling or sense of control over ones' life in general. Self-control refers to controlling ones' impulses in order to achieve a longer-term objective (Psychology Today, n.d). Weir (2012) mentioned that many social issues such as crime, debt, domestic violence, drug addiction, and overeating are due to a lack of self-control. When people engage in risky sports they conversely experience a sense of self-control since risky sport as a socially acceptable form of risk taking, requires the exertion of a great amount of mental and physical effort (Max, 2016). In addition, many people experience a range of emotions (caused by the release of hormones) and overcome their fears (such as the fear of heights when rock climbing) when engaging in risky sports. As such, many people participate in high risk sports to experience a sense of increased control over their own fears and emotional states (Woodman et al., 2010). This theory is not only relevant today, but was essential for the survival of the human species.

According to Goma-i-Freixanet (2004), risk taking behaviour was a typical characteristic of hunting-gathering societies as they had to explore new territories to obtain basic resources such as subsistence, shelter and to procreate. Successful hunters often had to engage in physically risky behaviour to obtain the resources necessary for survival. Contemporary society however takes physical risks for reasons other than survival, such as experiencing thrill and excitement in life (Goma-i-Freixanet, 2004). Risk taking in modern society permeates into the economic, legal, political and social spheres, as a different means of survival (Taylor et al., 2006). In the economic sphere, people take risks when they buy and sell stocks and shares or gamble in order to optimise their financial survival. In the legal sphere they take illicit drugs or exceed the speed limit on the road in order to experience increased emotional arousal. In the political arena, people challenge leadership positions and in the social sphere they often make controversial statements or alter their appearances in order to stand out from the crowd (Lyng, 1990). It is clear that people take many risks in their daily lives, and not all of these risks are deemed dangerous or fatal. It is however interesting that some people are willing to take risks, whether physical, financial or social, whereas others choose to avoid it. The prospect theory and framing effect will subsequently illustrate why some people are risk aversive and other risk takers.

2.2.2.2 Prospect theory and the framing effect

The prospect theory unearths the dichotomy of risk adversity on the one hand and engaging in danger, excitement and risk on the other (Barlow, Woodman & Hardy, 2013). According to the prospect theory, risk taking is influenced by the framing effect. Tversky and Kahneman (1985) noted that when two statements of the same value/outcome are given to respondents in an experiment, the decision to take or avoid the risk is influenced by the way in which the options are positioned. This means that when the same information is presented in different ways, it can evoke different reactions/emotions. People will therefore either take a risk or avoid taking a risk. The following examples illustrate Kahnemans' (2012) explanation of the framing effect. People feel more reassured when they are told that their odds of survival are 90% one month after having surgery than when they are told that their odds of mortality are 10% one month after surgery. Similarly, people are more inclined to purchase cold meats described as 90% fat free than meat described as having a 10% fat content. The following example proves that people take or avoid risks based on the phrasing of the statements (Kahneman, 2012, p.279):

"Problem 1: which do you choose?
Get $900 for sure OR 90% chance to get $1000
Problem 2: Which do you choose?
Lose $900 for sure OR 90% chance to lose $1000"

According to Kahneman (2012), most people are risk aversive in the first problem since they select "get $900 for sure" and risk taking in problem 2 by selecting "90% chance to lose $1000". Kahneman, Knetch and Thaler (1991) therefore noted that people are often willing to take a risk in order to avoid a loss (risk acceptant) as in problem 2, but they rarely take a risk to gain something (risk aversive) as in problem 1. Kahneman (2012) further states that in real life contexts, people often only see or experience one end of the formulation although the alternative formulation is apparent (but not explicitly stated). The alternative formulation might however not be apparent and although two people with the same or alternative personality types might be exposed to exactly the same formulation/ experience, one person might decide to take the risk and the other not. The prospect theory does not account for this individual difference. The next theory describes the systematic errors often made during decision making and risk assessment.

2.2.2.3 Optimistic bias

Weinstein (1980) developed a theory of risk in which optimistic bias was explored. Optimistic bias refers to the systematic errors people make when they interpret their chances (of risk) when they engage in an activity/event relative to an average group of people. A similar group of people can be shown the same set of risk taking statements and make different conclusions about the level of risk or likelihood of it happening to them and those around them. For example, people often believe that a negative event such as being injured in a car accident is less likely to happen to them and a positive event such as winning the lottery is more likely to happen to them, than another person (Weinstein, 1980). They also believe that their own chances are lower when the event is negative and undesirable. When the probability of an event is perceived to be great, the event is controllable and the person has experience with the event, they believe their chances are greater than the average. Weinstein (1980) further found that optimistic bias occurred when participants saw the event as controllable, meaning that they could influence it in some way, and they had some form of commitment or emotional investment in the outcome. In essence, when people believe they are immune from risk because of personal characteristics/ experience or that their actions reduce their own risk below the risk of others, they are more inclined to engage in risky activities and ignore precaution. This theory is relevant to rock climbing, more specifically, free solo climbing in which climbers ascend rock formations/walls without any form of protection and climb to heights of around 2 000 meters. This form of climbing requires extreme precision and there is no margin for error (Rich, 2015). These climbers often have a lot of experience and believe that by climbing and preparing in a detailed manner their risk of injury or death decreases or is lower than a less experienced climber. People however do not always possess all the information surrounding an event as described in the prospect theory and framing effect (see section 2.2.2.2), which means that they cannot produce an unbiased view and therefore erroneously assess the risks involved as lower (Weinstein, 1980). This is clearly evident from the many free solo climbers who have fallen to their deaths due to small mistakes that they did not account for. Kahneman's (2012) thinking aligns with this notion. The next theory moves away from the often unconscious cognitive fallacies when calculating risk and looks at the conscious reasons why people engage in risky behaviour.

2.2.2.4 Theory on edgework

The theory on edgework explains that when people participate in risky activities over a prolonged period of time they obtain a certain skill level which is required and allows them to elevate the activity (and the risks) in order to experience intense emotions such as fear, anxiety and excitement (Lyng, 2015). Many people experience boredom and a sense of personal stagnancy as a result of the routine of daily life. In order to overcome this feeling, they engage in risky behaviour to challenge their personal limits and social expectations. The theory on edgework therefore focuses on taking risks to explore the edges/boundaries of one's own life or of a culture (Lyng, 1990). Boundaries between the concepts of life and death, conscious and unconscious, and sanity and insanity, are often explored by this theory. Free solo rock climbers often push the limits between life and death when they climb without protective gear. People who take illicit drugs and large amounts of alcohol challenge the boundaries of consciousness and reckless drivers the societal constructs of sanity and insanity. By exploring the boundaries and pushing one's own physical and mental capabilities as in rock climbing, people often master and control their fears through mental toughness (Lyng, 2015). Mental toughness refers to effectively coping with adversity and pressure in different aspects of life, recovering from failure and set-backs, perseverance, believing in one's own capabilities, and controlling one's own future (Crust, 2008). The theory further focuses on maintaining a sense of calmness in order to avoid physical harm or death. This results in a sense of mastery. A sense of mastery is linked to heightened feelings of control over one's life. According to Lyng and Matthews (2007), control implies that risk takers do not override the fear associated with an activity, but acknowledge its existence and change it to pleasant emotional experiences such as thrill, excitement and mastery. Edgework refers to a combination of focused attention and intense emotional arousal that leads to altered perceptions of time and space, and feelings of a higher reality that in turn lead to a sense of authenticity and feeling truly alive (Lyng & Matthews, 2007). The theory on hardiness has laid the foundation for the development of the theory on edgework and will subsequently be described.

2.2.2.5 Hardiness

A theory developed by Morehouse, Farley and Youngquist (1990) attributes risk taking to the personality trait hardiness. Mental toughness as a cornerstone in the theory on edgework is based on the theoretical foundation of hardiness (Crust & Keegan, 2010). Hardiness assesses an individual's sense of control over the environment (and mastery) as well as their disposition to challenges. Morehouse et al.'s (1990) theory on mental toughness relates to the Type T personality, which refers to thrill seeking. This is complementary to

Zuckerman's (1994) theory on sensation seeking and one of the sensation seeking attributes, Thrill and Adventure Seeking. The Type-T personality includes stimulation, excitement, thrill, arousal seeking and risk taking, which is clearly visible in a range of behaviours such as crime, creativity, sex, drug and alcohol taking. Zuckerman (1994) also included aspects such as cortical arousal, reward and punishment in the limbic system of the brain, social behaviour, cognition, activity, mood and psychopathology in his explanation of sensation seeking and risk taking (Zuckerman 1994). Zuckerman (1994) evaluated the differences between high and low sensation seekers and found that the main difference between them is in their willingness to take risks. Zuckerman (1994) further noted that genetics and family environment, personal familiarity/experience with a certain activity/phenomenon, knowledge of the activity and socio-economic status contribute to how the need for risk taking is expressed by each individual. This means that the type of risks taken by an individual will depend on his/her upbringing, experience, knowledge and social standing. The inclination of an individual to take physical risks is therefore outlined by a multitude of aspects, and the participation in high, medium or low risk sport also determines what type of risk the person will take.

2.2.3 High, medium and low risk taking sports

Zuckerman (1983) placed different types of sport on a continuum from high to low risk taking based on consequence, objective- and subjective appraisal. High risk sports can be classified as sports in which the participant must accept the possibility of severe injury or death and people require specialised equipment and training to minimise the risks involved (Castenier, Le Scanff & Woodman, 2010b; Kupciw & MacGregor, 2012; Woodman et al., 2013). Golf and bowling were grouped as low risk sport since the possibility of injury and fatalities are rare. Body contact sports like boxing, rugby, wrestling and football were classified as medium risk as they rarely lead to fatalities but occasionally produce disabling bone injuries (Zuckerman, 1983). Skydiving and mountaineering were however placed on the high risk end of the continuum since serious injuries are likely and it includes a component of acute danger which might lead to fatalities (Zuckerman, 1983). High risk sports participants are therefore risk takers as they purposefully expose themselves to an unknown element of danger which could lead to injury or death.

Woodman et al. (2010) noted that high risks sports are usually grouped under one umbrella term/homogenised since the specified set of activities possess the same types of risk or the possibility of injury/death. High risk sports typically include mountaineering, sky diving, hang gliding, paragliding, racing, BASE jumping, bungee jumping, rock climbing, and

surfing to name a few. A superfluous grouping of these sports would mean that the nuances, risks and requirements of each sport would be overlooked (Woodman et al., 2013). When applying the definition of high risk sport to sports like soccer, one could possibly classify it as a high risk sport because the prevalence of injury is higher than sports like sky-diving or bungee jumping. Soccer is however not classified as a high risk sport because it does not lead to the possibility of death and does not require specialised equipment or training to minimise the risks involved in comparison to sky-diving or bungee-jumping (Woodman et al., 2013). Although high risk sports may lead to injury or death and require specialised equipment or training to regulate risk, great diversity exists between the sports. It is therefore redundant to group high risk sports together and assume homogeneity between these sports based on the definition of high risk sport. Bungee jumpers for example, do not need a lot of experience before they attempt a jump and do not need to prepare much before jumping. A failure to do so can however lead to disastrous consequences including serious injury and death if the jump is unsuccessful. Successful jumps conversely lead to extreme thrill (Woodman et al., 2010). A sport like mountaineering on the other hand requires a lot of preparation and planning that can take up to several weeks or months. People need to be experienced to take on this sport and insufficient planning can lead to serious injury or death. This planning extends beyond the preparation of the project and into the roles and responsibilities of each team member (Woodman et al., 2010). The actual activity not only involves extreme thrill, but also involves turmoil as explained by Krakauer (1997):

> What I was doing up here (climbing Mount Everest) had almost nothing in common with bungee jumping or sky diving or riding a motorcycle at 120 miles per hour. The ratio of misery to pleasure was greater by an order of magnitude than any other mountain I'd been on. I quickly came to understand that climbing Everest was primarily about enduring pain and … subjecting ourselves to week after week of toil, tedium and suffering (Krakauer, 1997, p138).

From these explanations it is clear that a great deal of diversity exists between high risk sports. Woodman et al. (2010) therefore noted that the concept of classifying high risk sport has been oversimplified.

2.2.4 Risk taking in extreme sport

Current literature on risk raking typically concentrates on socially unacceptable forms of risk taking, the dangerous nature of risks and avoiding risky behaviour such as sexual encounters with multiple partners, reckless driving, gambling and illicit drug taking. Many types of risk taking behaviour are however socially acceptable (Cazenave et al., 2007; Zuckerman, 1979). Engaging in extreme sports such as rock climbing, kayaking, mountaineering and surfing are socially acceptable ways of expressing sensation seeking needs and risk taking which leads to positive experiences (Cazenave et al., 2007). By engaging in extreme sports, people are able to test their physical abilities and experience a sense of accomplishment, self-confidence, knowledge of their own bodies and its limitations.

Those who push sports to the extreme often hide their intra-psychological conflict as a means of emotional auto-regulation. Some studies note that people partake in risky behaviour to regulate their emotional state by escaping self-awareness (Taylor & Hamilton, 1997). This emotional auto-regulation is evident in both socially unacceptable and acceptable risk taking behaviour (Castenier, Le Scanff & Woodman, 2010a; Cazenave et al., 2007; Woodman et al., 2010). When people focus on the physical sensations that they experience when engaging in risky behaviour such as an increased heart rate and a heightened sense of awareness they temporarily forget about aspects that cause distress in their lives. It is almost as if they feel removed from their real life setting and are free of negative emotions. This distantiation of real life circumstances when participating in extreme sport is clearly illustrated in the following excerpt (Krakauer, 1997, p.151):

> How much of the appeal of mountaineering lies in its simplification of interpersonal relationships, its reduction of friendship to smooth interaction (like war), its substitution of an Other (the mountain, the challenge) for the relationship itself? Behind a mystique of adventure, toughness, footloose vagabondage – all much needed antidotes to our culture's built-in comfort and convenience – may lie a kind of adolescent refusal to take seriously ageing, the frailty of others, interpersonal responsibility, weakness of all kinds, the slow and unspectacular course of life itself…

The reasons for participating in extreme sport are endless and are dependent on each individual. Michel, Carton and Jouvent (1997) explained the reasons for taking risks by focusing on emotional auto-regulation and Boredom Susceptibility. Michel et al. (1997) found that when female bungee jumpers experienced anhedonia (the inability to enjoy previously

enjoyed activities) they were also more likely to participate in risky activities to reduce the feelings of boredom. Michel et al. (1997) argued that women who take part in risky sports might do so in order to compensate for the perceived mundane stimuli of their lives. The extent to which this holds truth across different types of risky sports is not known. Further research has revealed that people with alexithymia, the inability to describe and identify one's own emotions, often participate in risky sports. Woodman et al. (2010) postulated that the high risk sports domain provides people with the opportunity to take ownership of their emotions and to initiate their own emotions. They found that ocean rowers who experienced alexithymia chose to spend time away from their homes and families in order to avoid the difficulties accompanied with expressing positive and negative emotions since they had specific difficulty in describing rather than identifying their own emotions. When these ocean rowers spent long periods away from home to escape the perceived difficulty of expressing emotions in their everyday relationships, they did so in order to experience self-induced emotions/ a sense of emotional self-regulation (Woodman et al., 2010). These persons however became interested in taking greater risks and pushing their own boundaries in order to maintain the sense of renewed emotion (Woodman et al., 2010). It is clear from these studies that there is a link between high risk sports and emotional experiences and that difficulty with expressing or dealing with negative emotional experiences is a motivating factor for participation in high-risk sports.

A different stream of research focuses on the reward system as a reason for participating in risky activities. Many athletes participate in risky sport because of an intrinsic reward which may motivate them to take risks and to master dangerous situations. Dieham and Armatas (2004) noted that voluntary risk taking is intrinsically motivated and self-determined people see potentially dangerous situations as a challenge while controlled people see it as a threat. Dieham and Armatas (2004) also found that low sensation seekers participate in low risk sport for extrinsic reasons such as health, appearance, weight control while high sensation seekers participate in high risk sport since they are intrinsically motivated by aspects such as competence and mastery. The need for emotional auto-regulation can also be described as an intrinsically motivating factor because people take greater risks in their various sports to experience positive emotions and reduce stress (Cazenave et al., 2007).

Traditionally, research focussed on physiological and demographic differences between risk takers and control groups but group differences are heterogeneous in risk taking populations (Llewellyn et al., 2008). Outdoor rock climbers often take more calculated risks when they feel confident in their own abilities to manage the risks involved and thereby

challenge their own abilities by climbing more difficult and dangerous routes. This level of confidence is linked to a sense of intrinsic motivation, because the more confident the athletes are, the bigger the risks become, and the more motivated they are to push their boundaries. Bandura (1997) noted that people challenge themselves by taking on greater risk as soon as they believe that they are capable of dealing with the situation and managing the risk. Kontos (2004) correspondingly stated that when respondents have high self-efficacy they pursue increasingly difficult goals and take calculated risks as their fear of failure declines and experience levels increase. With this declining fear of failure and increased self-efficacy, respondents also have a different perception of injury and death which exposes them to greater vulnerability and the possibility of injury (Kontos, 2004). This finding was confirmed by Crust and Keegan (2010) who found that student athletes who had greater confidence in their ability had a greater propensity for physical risk taking. This aligns to both the theory of edgework and unrealistic optimism. In line with this, Bandura (1997) mentioned that due to the high levels of self-efficacy, rock climbers, BASE jumpers and sky divers trust themselves, and their abilities, to negotiate risky situations. As such, one can conclude that people who take greater risks have stronger self-efficacy beliefs and trust that they can control the risks involved in the situation. In other words, they believe that they can mitigate the risks by controlling their own actions. This sense of self-control is clear in Willig's (2008, p.699) explanation of why people engage in risky sports. It also links to the positive emotional experiences of these athletes.

> (A) carefully staged scenario produces just the right balance between challenge and comfort in order to allow a certain kind of experience to become possible. The reason for participation is therefore not the feeling of pleasure but to match one's abilities with the demands of the context in order to test one's limits without being overwhelmed.

This statement outlines the motivation for self-testing and that when a person successfully completes a risky task a certain experience becomes possible. Clearly, people do not only take risks for the sake of risk taking. Zuckerman (1992) mentioned that risk is not the sole reason for participating in risk taking sports. Zuckerman (1983) assessed the level of sensation seeking tendencies and depth of scuba diving in a group of low and high sensation seeking student divers. High sensation seekers tended to look for novelty and preferred visual exploration in shallow water as opposed to deep diving. This indicates that risk is not the only factor involved in sensation seeking, but that novelty and new experiences also play a role. In addition, skill level and self-efficacy does not necessitate the need for risk taking (Zuckerman, 1983). Risk taking can be motivated by additional factors

such as the need for novelty. The types of risks that athletes take also differ substantially based on their motivations for participating in the sport and Deliberate Risk Taking and Precautionary Behaviour risk taking categories have recently been established. These classifications will subsequently be discussed.

2.2.5 Deliberate and Precautionary Risk Taking

Deliberate Risk Taking can be defined as the type of risk taking in which people deliberately expose themselves to dangerous circumstances and the elements of nature without taking any precaution to prevent serious injury or death (Woodman et al., 2013) Precautionary Behaviour in contrast refers to exposing oneself to dangerous situations and implementing safety precautions in order to minimise and control the danger associated with the situation (Llewellyn & Sanchez, 2008; Pain & Pain, 2005).

Llewellyn and Sanchez (2008) and Slanger and Rudestam (1997) have shown that many high risk sports participants take deliberate risks when engaging in high risk sports. Others have found that high risk sports participants engage in the sport in such a way that they can minimize and control the danger associated with the sport by exhibiting precautionary behaviour (Pain & Pain, 2005). This can include checking the rope and weather conditions before climbing a rock face. A rock climber may however purposefully apply precautionary measures such as practicing top roping or reconnoitring the rock face carefully before ascending, but end up climbing the rock without any protective gear (Pain & Pain, 2005). This indicates that the types of risks people take are dependent on the activity, the circumstances surrounding the activity and that both types of risks can be taken by one person. Since sensation seeking and risk taking are closely related, Kupciw and MacGregor (2012) further noted that there is a tendency to overlook the detail of different peoples' risk taking behaviours in sports.

Due to the limited and suitable assessment measures of risk taking attitudes and behaviour in the high risk domain, research on risk taking in high risk sport is limited (Castenier et al., 2010a; Myrseth, Tvera, Hagatun & Lindgren, 2012). Woodman and Bandura (2010) found that there were no suitable measures to assess risk taking behaviour in high risk sports. Current assessment measures are un-validated and one-dimensional. Previous studies have focused on the type of rock climbing (Woodman et al., 2013) or accidents and acute injuries as a measure of risk taking (Castenier et al., 2010a). Woodman et al. (2013) indicated that it is not accurate to classify people as risk takers based on the type of rock climbing or the type of accidents/injuries they acquire as people can deliberately engage in dangerous situations and experience life-threatening "close calls" but still avoid

accidents and injury. In addition, persons who implement safety precautions and minimise danger may experience accidents due to uncontrollable conditions. This indicates that accidents can be attained despite the implementation of precautionary behaviour. The Risk Taking Inventory was developed by Woodman et al. (2013) after Paquette, Lacourse and Bergeron (2009) measured deliberate risky behaviour and precautionary behaviour in high risk sport. It was noted that deliberate risky behaviour reflects a lack of understanding and consideration for the high risk sport environment as opposed to precautionary behaviour in which careful planning and awareness of the associated risks are present. It is important to assess risk taking behaviour on these two dimensions, Deliberate Risk Taking and Precautionary Behaviour, as validated by Woodman et al. (2013). By incorporating the prevalence and severity of injuries obtained while participating in high, medium and low risk sport, and not relying solely on this information to classify athletes into risk brackets might provide a more holistic answer to the reasons for taking risks. Kupciw and MacGregor (2012) found that there is a difference in the types of accidents obtained by high, medium and low risk athletes and the accidents obtained by high risk athletes are more traumatic and fatal. Deliberate risky behaviour is typically associated with a greater number of near misses and accidents whereas Precautionary Behaviour is typically associated with fewer near misses and accidents. This can be attributed to the safety checks and other precautionary behaviour implemented before engaging in the high risk activity (Kupciw & McGregor, 2012). Woodman et al., (2013) states that it is important to understand the motives involved in Deliberate Risk Taking and Precautionary Behaviour due to the potentially life threatening consequences of engaging in high risk sports. Sensation seeking traits can provide insight into this motivation.

2.3 Sensation seeking

Sensation seeking has been defined as “a human trait characterised by the need for varied, novel, and complex sensations and experiences, and the willingness to take physical and social risks for the sake of such experiences” (Zuckerman, 1979, p. 10; Zuckerman, 1990, p. 313). It is also referred to as novelty-, arousal -, thrill -, experience -, excitement - and fun seeking (Zuckerman, 2009). Sensation seeking has further been conceptualised as a mechanism for survival and reproductive success, and has been located on the one end of a continuum with avoidance behaviour on the other extreme (Zuckerman, 1990). Sensation seeking as characterised and studied by Zuckerman (1979) is comprised of four main components which include Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (Dis) and Boredom Susceptibility (BS). Thrill and Adventure Seeking (TAS) refers to a desire to participate in an activity (such as rock climbing) that contains an element

of unusual sensation and risk that goes beyond conventional activities. Experience Seeking (ES) relates to being open to new sensations/ experiences through art, music, drugs, and an unconventional lifestyle (Zuckerman, 1979). Disinhibition (Dis) refers to the novelty experienced through social situations like parties, drinking and sexual relations. Boredom Susceptibility (BS) refers to an intolerance and avoidance of repetition and predictability such as routine work and dull persons (Zuckerman, 1990). These components of sensation seeking can be linked to high, medium and low risk activities and sports.

2.3.1 Sensation seeking in sport

According to Zuckerman (2009) high sensation seekers are more likely to engage in extreme sports that provide novelty and intense experiences and sensations of speed and excitement. The activities leading to the desired level of stimulation differ in terms of risk level. A high sensation seeker typically estimates the risk of an activity as lower; anticipates more pleasure and experience less anxiety than a low sensation seeker (Zuckerman, 1983; Zuckerman, 2009). This means that a high sensation seeker is able to take risks that a low sensation seeker would not take as he/she is not anxious about the outcome of the activity. Goma-i-Freixanet (2004) noted that when people participate in high risk activities, as either a professional or a novice, they engage with environments where they have the opportunity to encounter stimulation through the mind and the senses. Such stimulation can include height, depth, speed, light or darkness and changing temperatures or wind (Goma-i-Freixanet, 2004). High risk sports participants enjoy unconventional and exciting experiences, avoid repetition and routine encounters and have low levels of anxiety since anxiety can have an influence on the physical performance of the athlete in these extreme conditions. Anxiety is associated with the rational or irrational fear of injury or death. High sensation seeking skiers were found to be more at risk for injuries due to their tendency to underestimate the risk involved in relation to low sensation seekers (Zuckerman, 1979). Low sensation seekers also experienced anxiety more rapidly as a result of appraised risk and showed mental avoidance as depicted by accelerated heart rate patterns (Zuckerman, 1990).

Campbell, Tyrrel and Zingaro (1993) similarly found that high sensation seekers underestimated the risk involved in extreme sports as compared to low sensation seekers. Zuckerman (1979) asked sensation seekers to rate the risk associated with various activities and indicate how often they engaged in them. It was found that the more experienced a person was in an activity, the less risky it was judged to be. This means that the more experienced a person becomes, the less anxious they are, as they understand the risks involved and the possibility of injury thus reflecting the Precautionary Risk Taking profile.

Zuckerman (1979) however attributed this to the sense of accomplishment and stated that people become more risky when they push their own limits. Once they succeed without obtaining a serious injury, they experience a sense of accomplishment and increased confidence in their own abilities. Llewellyn and Sanchez (2008) correspondingly found that people who take on precautionary behaviour are more likely to take calculated risks once their confidence in their own ability to manage these risks increase. This means that the more confidence they have in their own abilities, the more calculated their actions become. These results also supported the findings of a study conducted by Kontos (2004) in which sports participants with high self-efficacy were less likely to have a fear for failure, were more likely to set goals that are challenging and to take risks that are calculated rather than reckless. Fave et al. (2003) similarly found that high risk athletes often mention that they want to be in control of risks. This sense of control is acquired through experience. The sensation seeking theory predicts that those highest in sensation seeking needs will take greater risks in high risk sport in order to experience novel and intense sensations (Zuckerman, 1994). As such one can conclude that experienced athletes take greater risks but that they are calculated in their approach as opposed to the reckless and dangerous risks taken by amateurs.

Slanger and Rudestam (1997) assessed sensation seeking and risk taking in skiers, rock climbers, kayakers and stunt flyers. They classified rock climbers into extreme or high risk takers based on their climbing behaviour. Extreme risk taking climbers were defined as those climbers who ascended walls without protective ropes (free solo climbers) and high risk takers as those climbers who used ropes and protective gear. They found that extreme risk takers had higher self-efficacy than high risk takers. The high risk group was more likely to take greater risks as they had a greater need for mastery and control of their emotional states than the extreme risk takers (Slanger & Rudestam, 1997). Individuals may experience a sense of control when they are rock climbing and judge themselves as being capable of controlling the danger involved in the sport. They also anticipate the positive experiences of successfully completing the task and therefore decide to participate in the activity (Castenier et al., 2010b). According to Hovarth and Zuckerman (1993), high sensation seekers value the rewards and arousal of such activities more than low sensation seekers.

Studies that compared medium risk sports to lower risk sports and/or control groups found that medium risk athletes scored higher on Thrill and Adventure Seeking and Total Sensation Seeking scores than lower risk athletes (Goma-i-Freixanet, 2004). Medium risk athletes as compared to control groups obtained higher Disinhibition scores due to the fact that these sports and the athletes are more sociable than non-athletes (Goma-i-Freixanet, 2004). Goma-i-Freixanet (2004) further found no significant differences between low risk sport participants and people interested in sport or college students. When low risk sports participants were compared against non-athletes, they scored significantly higher on the Total Sensation Seeking Scale, Thrill and Adventure Seeking and Disinhibition subscales. These studies reveal that extreme and high risk sports participants typically score higher on Thrill and Adventure Seeking subscale than medium and low risk athletes although medium risk athletes score higher than low risk athletes and low risk athletes score higher than non-athletes (Goma-i-Freixanet, 2004). Persons who participate in high risk sport and score high on Thrill and Adventure Seeking represent the population of people who have a tendency for sensation seeking beliefs, ideas, attitudes, and behaviour but has the ability to cope with boredom when required (Amber, 2010). Cronin (1991) conducted a study amongst 20 members of a university mountain climbing club and 20 members of a control group. The climbers scored higher on Experience Seeking subscale, Thrill and Adventure Seeking subscale and the Total Sensation Seeking than the control group. The climbers have been participating in the sport for an average of four years and Cronin (1991) concluded that the climbers participated in the sport to meet their sensation seeking needs.

The differences between men and women's sensation seeking tendencies were studied by Burnik, Jug and Kajtna (2008). The study of male and female Slovenian mountain climbers revealed no significant difference in the sensation seeking needs of men and women and also showed no differences in age. Due to the lack of differences, Burnik et al. (2008) concluded that the sensation seeking tendencies of male and female mountain climbers are similar. This is in contrast to the age related differences in sensation seeking tendencies found by Zuckerman (2009) and Nauert (2016). Sensation seeking needs decline with age similar to risk taking and reward seeking tendencies. Zuckerman (2009) noted that the sensation seeking scores for men and women reach a peak in the early 20's and decline with age each decade thereafter. Zuckerman, Eysenck and Eysenck (1978) congruently found that Thrill and Adventure Seeking and Boredom Susceptibility scores show the greatest decline with age and a clear linear decrease in sensation seeking with age on the Total Sensation Seeking score. Zuckerman (1979) explains this trend by noting that sensation seeking declines with age because experience in life leads to increased conservatism and decreased risk taking. Sensation seeking further declines with age due to

biological changes such as slowing cortical activity and the reduction of gonadal hormone output (Zuckerman et al., 1978). Nauert (2016) similarly found that Dopamine, a neurotransmitter in the brain responsible for reward and pleasure, movement and emotional responses, declines together with people's tendencies to take risks. A study conducted with volunteers found that more risks were taken when people were given a drug that increased their dopamine levels. Dopamine levels naturally decline by 10% with every decade of ones' life and as such people seek fewer rewards as they age.

The Carver and Scheier Risk and Excitement Inventory (1981) consists of 2 risk taking profiles. The first profile "escape from awareness" is correlated to Disinhibition on the Sensation Seeking Scale V, depression, pessimism, anxiety and low self-esteem. Taylor and Hamilton (1997) proposed that such individuals attempt to escape from self-awareness and therefore engage in risk taking activities. The second profile "compensatory self-regulation" was moderately correlated with Thrill and Adventure Seeking on the Sensation Seeking Scale V. Taylor and Hamilton (1997) stated that risk taking activities provide such persons with a positive self-image and increases their sense of value. Cazenave et al. (2007) found that amateur risk taking women were more impulsive and higher in sensation seeking than professional sports women. Professional risk taking women were lower in impulsivity and sensation seeking traits. They noted that these women were able to master dangerous situations because of careful planning and anticipation of inherent danger. Professional risk taking women were not attracted to risk or captivated by it, but experienced it as a constraint that they must accept and overcome. They further kept risk of the situation to a minimum by planning upfront without seeking sensation (Cazenave et al., 2007). Women who engaged in leisurely activities were more impulsive and obtained higher scores on sensation seeking than professional sports women and non-risk taking sports participants. Jack and Ronan (1998) conducted a study amongst a group of Australian extreme sports participants and found significant differences between low and high sensation seekers on impulsiveness. High sensation seekers scored significantly higher and positive correlations were found between sensation seeking subscales and impulsiveness dimension. There were no significant differences between high and low risk sports groups. Jack and Ronan (1998) therefore noted that individual tendencies toward impulsivity are related to sensation seeking.

2.4 Increased participation and safety in risky sports and rock climbing

Recent years have seen increased participation rates in high risk sports such as kayaking, scuba diving, sky diving, snowboarding, skiing, mountaineering and rock climbing (Burnik et al., 2008; Guszkowska & Boldak, 2010; Jones, Asghar & Llewllyn, 2008; Murray, 2003; Paquette, Dumais, Bergeron & Lacourse, 2016; Shoham, Rose & Kahle, 2000). Ewert et al. (2013) noted that between 2009 and 2010 the participation rates for white water kayaking increased by 35% and 21% for sea kayaking. Participation in rock climbing has also increased consistently in the United States of America and European countries over the past few years (Ewert et al., 2013; Frauman & Clevenger, 2010). According to the Outdoor Industry Foundation (2011), there was a 20% increase in the participation rates for rock climbing in the USA from 2010 to 2011. Sheel (2004) similarly noted that participation in the sport has increased in both the recreational and competitive components over the last 2 decades. In South Africa, rock climbing is seen as a rapidly growing extreme sport and the Western Cape is a popular location for rock climbing (Wegner, Pagel, Smit, Straszacker, Swart & Taft, 2015).

Increased participation in high risk sports also lead to increased numbers of injuries. Wegner et al. (2015) found that increased levels of participation in risky sports such as rock climbing should be accompanied by awareness of the common injuries in these sports. In a survey conducted by Wegner et al. (2015), 247 participants were asked about the injuries that they experienced in rock climbing in the past year. An average of 1.5 injuries was reported per person with the majority of injuries occurring in indoor climbing facilities. In addition, 90% of professional climbers who were climbing more difficult routes reported injuries, as opposed to less than 10% of beginner climbers. Jones et al. (2008) also found that climbers who climbed higher grades and more technical routes obtained more injuries. Booth, Marino, Hill and Gwinn (1999) further noted that bouldering, a type of rock climbing done without ropes close to the ground, leads to more injuries because it uses the least amount of protective gear.

Alternative high risk sports such as snowboarding and skiing lead to head, neck and trunk injuries and these types of injuries in 12-17 year olds are five times more prevalent than in 34+ year olds (Martha et al., 2009). Traumatic brain injury is also the leading cause of traumatic deaths in winter sports (Ruedl, Abart, Ledochowski, Butscher & Kopp, 2012). Taylor et al. (2006) noted that risky sporting activities are a public health concern and millions of dollars are spent annually on search and rescue missions and medical services. In addition, members of the search and rescue parties often have to go through training to

perform in extreme environments and thereby place their own lives at risk. Risk taking behaviour in high risk sports lead to financial and public health problems for risk takers and those who attempt to save their lives (Taylor et al., 2006). Although participation in high risk sports is increasing, and the uptake of safety equipment prevents serious injury, it does not reduce the frequency or intensity of risk taking. Reudl et al. (2012) found that safety equipment can lead to increased risk taking behaviour. People wearing safety equipment such as helmets often elicit higher levels of risk taking as compared to those who are not wearing safety equipment. Sulheim, Holme, Ekeland and Bahr (2006) similarly revealed that skiers who described themselves as risk takers were more likely to wear a helmet. It can be argued that when they wear protective gear such as a helmet, they believe they are controlling the inherent danger that leads to injury and can take additional risks to push their limits to experience new sensations. Although people take additional risks when wearing safety equipment, skiing helmets for instance still reduce head injuries up to 60% and is associated with reduced rates of skull fractures (Reudl et al., 2012).

Woodman et al. (2013) have also shown that there is a relationship between previous injury and subsequent risk taking. Paquette et al. (2014) conducted a study amongst snowboarders and alpine skiers, aged 14-17, to assess the link between the severity of an alpine sport injury sustained in the last 12 months and risk taking. The results indicated that risk taking in snowboarding and alpine skiing was significantly related to male gender, seeking intense sensations and physical aggression. High levels of perceived skill were also associated with greater risk taking. It was further found that snowboarders with previous injuries were more likely to sustain injuries in the future (Paquette et al., 2016). Consequently, previous injury does not only lead to increased risk taking, but also leads to increased injuries in the future because athletes take greater risks on more difficult routes as their skill levels improve. The concept of risk is important in the high risk sports environment as participation in these sports have increased in the past few years. There is a need for more research on the meanings people give to voluntary risk raking and sport such as rock climbing.

2.5 Rock climbing

Rock climbing has been defined as a high risk sport in which the participants have to climb across, up or down artificial rock walls or natural rock formations (The River Rock, 2016). Rock climbers focus on reaching the summit, endpoint formation or wall of a pre-determined route without falling. Rock climbing is a demanding sport that tests physical and mental strength, agility, endurance and balance and necessitates the need for specialised equipment and training to manage the risks involved (Llewellyn & Sanchez, 2013). It is divided into a range of sub-disciplines and styles and due to the variety of rock formations, route difficulty and route options it contains an element of individual choice (Chalaloupsky, 2013). The different sub disciplines of climbing are commonly described as free climbing, sport climbing, traditional climbing, solo climbing and bouldering. Each of these styles will be briefly explained as risk taking behaviour within each discipline and across participants might differ.

- Free climbing refers to ascending a rock face by relying on one's body (hands and feet) (Max, 2016).
- Sport climbing is defined as ascending a rock face with pre-equipped bolts that are anchored into the wall/rock. As the climber ascends, he/she clips a rope to the bolts for protection on a predetermined route. The climber is hooked to a rope with the loose end controlled by a 'belayer' on the ground. The 'belayer' brakes the free flowing action of the rope and prevents the climber from falling. The climber is protected from a fall by the bolts, rope and the 'belayer'. Sport climbing is considered the safest type of climbing (Chalaloupsky, 2013; Max, 2016) and although it is the safest form of climbing, climbers fall more frequently because they are protected by the bolts, rope and the belayer (Sheel, 2004). When climbers slip or fall, they do so in a controlled environment and rarely obtain serious injuries since they do not fall very far. Because of the control over the environment, these climbers take greater risks to experience greater sensations and push their limits. They try to climb higher grades and fall more frequently in order to succeed at these grades (Sheel, 2004).
- Traditional climbing or 'trad' climbing refers to climbing a wall by placing one's own safety equipment (nuts and camming devices) into cracks as one progress up the rock face (Sheel, 2004). Max (2016) noted that the climbers only rely on the safety equipment for safety and use their limbs to climb up the walls. Traditional climbing does not make use of predetermined routes and climbers explore any possible route to climb up the wall. This type of climbing also tests climbers' mental ability and judgemental skills. Traditional climbing is much safer today because of technical and

technological advancements in terms of the equipment which minimise the risk to some extent.

- Solo climbing refers to climbing solo/alone without a team and with less equipment. It is considered to be the purest and most dangerous form of climbing (Llewellyn et al., 2008; Llewellyn & Sanchez, 2013). The climber does not make use of a rope which can lead to serious injuries. Solo climbing is also divided into roped solo climbing, the safer variation of the sport in which the climber is secured to a rope and self-locking mechanism. Deep Water Solo Climbing refers to climbing cliffs that overlook the ocean or body of water without any ropes or other equipment to assist the climber in the ascent (Max, 2016). Free Soloing, the most dangerous type of Solo climbing, refers to climbing without any equipment for safety purposes. Climbers only use their hands and feet to climb and falling nearly always results in death. Free Solo climbers experience extreme excitement due to the risks involved (Max, 2016).
- Bouldering is a type of climbing in which boulders between two and 15 meters are climbed without a rope. The boulders are typically large natural or artificial boulders that can be found in gyms or outdoor urban areas (Draper et al., 2011). The climbers take on challenging problems on short routes close to the ground (Llewllyn et al., 2008). This type of climbing requires more endurance and strength than traditional or sport climbing. It allows the climber to perform more dangerous moves as the climber is not as high from the ground as traditional or sport climbing. When the climbers fall, they do so over landing mats to prevent serious injuries and these falls are considered to be short. Max (2016, paragraph 3) refers to bouldering as "…the perfect sport for a thrill seeker. There's never a moment during the course of the problem, where you can't get hurt, or the risk of getting injured is zero. This factor attracts daredevils from all around to give it a try".
- Mountaineering is the predecessor of rock climbing and is also known as Alpinism. It requires a team of climbers to climb together for weeks. The climbers carry equipment, food and shelter with them as they ascend a mountain and endure extreme weather conditions (Max, 2016).
- Ice climbing refers to ascending an ice wall or frozen waterfall using specialised equipment such as crampons (device attached to footwear to improve mobility on ice and snow) and ice axes (Max, 2016).

2.5.1 Grading scales for rock climbing

Grading scales are used in various sports to keep track of the athlete's progress. As with any sport, rock climbing makes use of various grading scales. Rating/grading systems are typically based on the local areas' climbing traditions, size or height of climbers, degree to which the climb can be protected from long falls and the type of rock (Sheel, 2004). The main grading scales used throughout the world include the American Yosemite Scale (YSD), the British Tech/adj, French, UIAA and the Ewbank used in New Zealand, Australia and South Africa. The table below illustrates the different climbing grades (Draper et al., 2011).

*Table 2.1: A comparison of international climbing grade*s (Draper et al., 2011).

YDS (USA)	British Tech/Adj		French	UIAA	Ewbank (Australia, NZ, and South Africa)
5.2			1	I	
5.3			2	II	11
5.4			3	III	12
5.5	4a	VD	4	IV	12
5.6		S	5a	V+	13
5.7	4b	HS	5b	VI−	14
	4c				15
5.8		VS	5c	VI	16
5.9	5a	HVS	6a	VI+	17
5.10a		E1	6a+	VII−	18
5.10b	5b		6b	VII	19
5.10c		E2	6b+	VII+	20
5.10d	5c		6c		21
5.11a		E3	6c+	VIII−	22
5.11b			6c+	VIII−	23
5.11c	6a	E4	7a	VIII	24
5.11d			7a	VIII	
5.12a		E5	7a+	VIII+	25
5.12b	6b		7b		26
5.12c		E6	7b+	IX−	27
5.12d	6c		7c	IX	28
5.13a		E7	7c+	IX+	29
5.13b			8a		
5.13c	7a		8a+	X−	30
5.13d		E8	8b	X	31
5.14a			8b+	X+	32
5.14b	7b		8c		33
5.14c		E9	8c+	XI−	34
5.14d	7c		9a	XI	35
5.15a			9a+	XI+	
5.15b			9b		

Grading scales are further based on “redpoint” or “on-sight” assessments. A redpoint climb refers to a climb in which the rock climber ascends the rock face without falling or weighing the rope after a practice round on the route (International Federation of Sport Climbing, 2010). In some instances, climbers are allowed a practice run in which the climbers may see and climb the route with frequent rest on the rope or by top roping. On-sight climbing however refers to ascending the route the first time without prior knowledge or inspection of the route (Draper et al., 2011). In a competitive environment, climbing ability is assessed by providing competitors a preview and one attempt on a route (Draper et al., 2011). The height achieved by the climber determines the points awarded to the competitor. The higher the competitor climbs, the more difficult the route becomes (International Federation of Sport Climbing, 2010).

In a study conducted by Draper et al. (2011), 29 competitive rock climbers were asked to describe their best on-sight lead ascend with the Ewbank grading scale. After climbing a specifically designed indoor route that corresponded with a particular grade, they were asked to report on their level of climbing. The male rock climbers tended to slightly over estimate their self-report ability when compared to their actual assessed grade, whereas female climbers tended to underestimate their self-report grades in comparison with the actual achieved grade. This indicates that men are more likely to over-evaluate their level of climbing as opposed to women. Gender differences are not only evident in the self-report ability of rock climbers but also in the types of risks and sensations that they seek.

2.5.2 Risk taking and sensation seeking in rock climbing

In rock climbing, sensation seeking predominantly takes on physical risk taking. Since rock climbing is comprised of sub-disciplines, and these sub-disciplines are not all deemed equally risky, it is important to understand how Deliberate and Precautionary Risk Takers approach the sport and what type of sensation seeking they experience. In rock climbing, as with other extreme sports such as skiing or kayaking, the level of risk taking differ based on the sub-discipline that the athlete participates in. To this extent, Llewellyn et al. (2008) conducted a study amongst British rock climbers and categorised them according to pre-defined risk taking categories based on the sub-discipline of rock climbing that they participated in. High risk takers were seen as rock climbers who participated in soloing or traditional leading, and medium risk takers as those who participated in indoor sports leading, outdoor sports leading and bouldering (Llewellyn et al., 2008). The categories were based on the potential for falling which could result in serious or fatal injuries. Sport climbing was categorised as medium risk as it has fixed bolts for belaying and the distance of the routes are shorter than traditional climbing routes (Llewellyn et al., 2008). Protection in the

form of chocks, nuts, tapers and camming devices in traditional climbing can only be placed by the climbers and a fall during traditional climbing is longer and more dangerous since the self-placed protection and belaying devices do not have to be sufficient, and there are no pre-placed anchors or bolts (Chalaloupsky, 2013, Llewellyn et al., 2008). A similar study conducted by Martha et al. (2009) classified traditional climbers as high risk since they ascend high rock faces and place their own protection and mobile anchors using stoppers-nuts, straps and friends rather than pre-placed bolts. These climbers can fall between 20-30 meters before being stopped by a rope, which increases their risk of serious injury or death. This means that rock climbing may be seen as an extreme sport in which the participants take risks, but the type of risk can be based on the type of climbing that they perform.

Subsequently, risk taking behaviour in rock climbing can be based on deliberate or precautionary behaviour. Llewellyn and Sanchez (2013) assessed individual differences in risk taking in 116 participants and found that sensation seeking and impulsivity lead inexperienced climbers to take deliberate risks when leading (climbing up a route first and securing the rope to the bolts) and experienced climbers to take calculated risks when leading. This clearly shows that the same type of activity, lead climbing, can result in different types of risk taking based on the level of experience of the climbers. Sensation seeking tends to drive inexperienced climbers to take deliberate risk as opposed to experienced climbers (Llewellyn & Sanchez, 2013). Llewellyn and Sanchez (2013) subsequently found that the climbers' abilities were positively associated with the difficulty and frequency of rock climbing and greater self-efficacy and confidence translated into greater risk taking (Llewellyn et al., 2008). This means that the risk taking behaviour of inexperienced and experienced climbers differs. Sensation seeking behaviour influences inexperienced climbers to take deliberate risks, and self-efficacy leads to greater risk taking in experienced climbers (Llewellyn et al., 2008). When a climber's level of experience and ability increases, many rock climbers become motivated to engage in riskier forms of practice which provides them with the opportunity to challenge their own abilities and maintain optimum levels of arousal. Llewellyn and Sanchez (2008) found that experienced rock climbers took more calculated risks and were not as motivated by a need for impulsivity and sensation seeking as inexperienced rock climbers. More experienced rock climbers also experienced greater challenges and took greater risks because of the grade and length of the routes. As with other sports, rock climbers take greater risks once they become confident in the ability to climb more difficult routes and experience a need for greater mastery and ability to manage their emotional states (Crust & Keegan, 2010; Slanger & Rudestam, 1997). This means that rock climbers who are more experienced and confident can control their levels of anxiety and fear which allows them to climb more difficult routes. Llewellyn and

Sanchez (2013) found that 43% of climbers were motivated to do solo climbing and 76% lead climbing as a result of strong self-efficacy beliefs. In addition, climbers with higher self-efficacy took greater risks. In contrast 22% of climbers opted for top roping since they were not motivated by the risks involved in solo and lead climbing. Top roping (a form of climbing where the safety rope is positioned above the climber at all times and anchored to the climbing wall) is classified as a medium/low risk sub-discipline within the sport of rock climbing. This sub-discipline is medium/low risk because the climber is protected by a top rope and the chances of injury are therefore smaller (Draper et al., 2011). This means that top rope climbers may be motivated by factors other than self-efficacy, and this type of risk taking (deliberate or precautionary) differs from solo and/or lead climbers. Although climbers may be classified as Deliberate or Precautionary Risk Takers, the differences between the sub-disciplines may not be as clear cut. Llewellyn and Sanchez (2013) subsequently mentioned that sensation seeking and impulsivity are relatively independent of situational factors and warned against assuming similar risk taking behaviours/needs in rock climbing populations due to elevated sensation seeking needs across the group.

Zuckerman (1979) however, mentioned that risk taking is linked to sensation seeking through the expression of a need for new experiences, intense and complex self-testing. Sensation seeking is positively related to riskiness in sports (Zuckerman, 1983). Although risk taking is a component of sensation seeking, more specifically Thrill and Adventure Seeking, it is unclear whether different types of risk takers associate with the same or different components of sensation seeking (Zuckerman, 2009). Frauman and Clevenger (2010) conducted a study amongst 30 university students who participated in bouldering. They assessed their sensation seeking needs and their level of perceived ability. The results indicated that those who described themselves as beginners or elite boulderers had higher mean scores on Thrill and Adventure Seeking than advanced and intermediate boulderers. Elite and beginner athletes had lower scores on Experience Seeking than intermediate or advanced boulderers. Frauman and Clevenger (2010) further found that different groups of boulderers did not share the same sensation seeking traits. Elite climbers were more susceptible to Boredom and less inhibited than beginners but was similar in terms of Thrill and Adventure- and new Experience Seeking.

Zuckerman also (1983) postulated that high sensation seekers participated in high-risk sport to experience unusual sensations and novelty and added that high sensation seekers had a tendency to underestimate the risks involved in their sport of choice. According to Woodman et al. (2013) high sensation seekers are more focussed than low sensation seekers when they participate in risky activities such as climbing. In addition,

Precautionary Risk Takers implement safety precautions and are prepared for the risky activities before they engage in these activities. Crust and Keegan (2010) however noted that some sports participants might carry on with the sport despite minor injuries. This behaviour might however lead to the increased risk of additional or more serious injuries. The risk taking attitudes can therefore lead to negative outcomes for those sports participants who choose to ignore medical advice. Nelson and McKenzie (2009) found that the most common injuries associated with rock climbing included injuries to the lower extremities, strains, fractures and sprains. Although safety equipment has become more reliable and durable, more than half of rock climbers sustain at least one rock climbing injury per year (Jones et al., 2008). By understanding the differences in rock climbers' risk taking and sensation seeking behaviour in the South African context, safety standards and precautions can be devised specifically for these athletes.

Martha et al. (2009) postulated that traditional rock climbers had higher climbing safety perceived competence than lead, top and bouldering climbers. Traditional rock climbers had higher climbing safety perceived competence as they managed risks and learnt safety techniques. As opposed to Kontos' (2004) results, self-efficacy and lower propensity to fear failure, Martha et al. (2009) found that traditional climbers expressed higher perceived risk of getting seriously injured than the boulders, top and lead climbers. The researchers noted that risk exposure is not systematically linked to bias in risk perception. The study showed that those involved in higher risk (traditional) climbing were aware of the propensity to get seriously injured and they were conscious of their exposure to risk. This did not deter these climbers from participating in a more dangerous form of rock climbing.

Robinson (2008) also noted that one of her participants felt that climbing is safe if you have the knowledge required to successfully complete the task at hand. This can be related to the Precautionary Risk Taker defined by Woodman et al. (2013). Yates, a climber from England, worked as a roped access worker and mentioned that rock climbers and cavers were safer workers because of the skill that they had acquired from rock climbing and the ability to protect themselves with rope skills, being unafraid of heights, and remaining calm under pressure as opposed to the active and unwise risks taken by those who do not share their background (Robinson, 2008). Rock climbers also engage in the activity of rope work and it was argued that the rock climbers do not take risks when they are at work because it is their means of survival. As such risk taking and sensation seeking are not evident in the climbers when they are working as roped access workers. During normal working hours, they are not looking for variety or novelty. Instead they actively seek out these experiences and take risks when they engage in rock climbing as a recreational activity (Robinson, 2008).

The motivation for participating in the activity therefore shifts from earning a living to experiencing excitement and novelty and rather than being risk aversive, they become risk takers. Not only are people seen as low, medium or high risk takers based on the activity in question, but they are also classified as high or low sensation seekers due to the correlation between sensation seeking and risk taking (Zuckerman, 1979).

2.6 Conclusion

The distinction between Deliberate and Precautionary Risk Takers might not be as clear cut as originally thought and it is important to measure the intent of risk in athletes as to ensure that the group is not described in a singular manner as this might influence sensation seeking results and act as a confounding variable. In addition, the types of risks people take have an impact on the implementation of safety regulations in the sport. Although Woodman et al. (2013) designed and validated the Risk Taking Inventory and identified the two groups of risk takers, it is still not clear whether these descriptions hold truth for different types of sports including rock climbing, and within the different sub-disciplines of rock climbing. In addition, sensation seeking behaviour has a very different influence on risk taking in rock climbing, and this relationship in the South African rock climbing population is unknown. This literature review focused on risk taking in general, and the reasons why people choose to partake in risky activities. It further classified risk taking into high, medium and low risk sports and focused more extensively on risk taking in extreme sports, including rock climbing. More detail was provided on Deliberate and Precautionary Risk Taking. The discussion then moved on to the construct of sensation seeking and how it is manifested in sports. The sport of rock climbing was examined together with risk taking and sensation seeking behaviour. The next chapter will focus on the research methodology and will unpack the research design and the sample. In addition, the third chapter will unpack the measurement instruments, the data collection procedure and the ethical considerations. The chapter will conclude with a short description of the data analysis.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The current research study aimed to understand risk taking in rock climbers by assessing the differences between Deliberate and Precautionary Risk Takers. Additionally, the research sought to understand the differences between these groups in terms of their associations with sensation seeking.

This chapter outlines the research design that was followed, the sampling method and the sample composition including the demographic variables. The chapter also discusses the measurement instruments that were utilised namely the demographic questionnaire, the Risk Taking Inventory and the Sensation Seeking Scale-V. After the discussion of the measurement instruments, an exposition of the data collection process and ethical considerations follows. Before the conclusion a brief outline of the data analysis method is provided.

3.2 Research design

The study was based on a quantitative exploratory research design since previous research on Deliberate and Precautionary Risk Takers as defined by Woodman et al. (2013) is limited. The exploratory research design is often used to understand and establish the basic relationships between variables before more complex experimental research studies are conducted (Salkind, 2010). The purpose of the exploratory design was to distinguish between Deliberate and Precautionary Risk Takers and to understand how these categories of risk takers associate with sensation seeking constructs. This design does however not account for cause-and-effect relationships.

3.3 Sampling

3.3.1 Sampling technique

Sampling procedures can be broadly categorised into probability and non-probability sampling methods. Probability sampling is based on the theory of probability and the principle that each unit in a population has an equal, non-zero chance of being selected in the sample (Sarantakos, 2005). When using probability sampling methods the results can be generalised to the broader population (Dixon, Singleton & Straits, 2009). Non-probability sampling procedures, however, do not adhere to the probability theory and is not representative of the broader population. These procedures are frequently used in exploratory research such as the current study (Sarantakos, 2005). Since non-probability sampling has no basis for making inferences, the results cannot be generalised from the sample to population of rock climbers. Non-probability sampling methods are used due to time constraints and economic feasibility as probability sampling methods take up a great amount of time, resources and cost (Pedhazur & Pedhazur Schmelkin, 1991). Dixon et al. (2009) notes that although non-probability sampling methods cannot be used for statistical inferences, it can be used to expand and generalise theories.

The current research made use of a purposive sampling method, which can be described as a non-probability sampling method. According to Babbie (2016), purposive sampling is also described as judgmental, selective, or subjective sampling. It refers to a method employed whereby the researcher selects the participants based on his/her judgment of the participant's ability to contribute relevant and detailed information (Jupp, 2006). In essence, each participant will be the most useful or representative of the population. The researcher furthermore selects the participants based on criteria including their specialized knowledge of the research problem, capacity and eagerness to take part in the study (Jupp, 2006). This technique is used when one has prior knowledge of the population, its components and the purpose of the research (Babbie, 2016). The goal of purposive sampling is also to assess certain characteristics of the population in order to address the research aims and objectives.

The present study more specifically made use of a homogenous, purposive sampling method. This technique is used to sample those people who share similar characteristics/behaviours (such as rock climbing). This method is used in order to examine in detail the specific characteristics of the group of interest.

3.3.2 Sampling frame

The sampling frame comprised of rock climbers who are members of the Mountain Club of South Africa (MCSA). The MCSA was established in 1891 and is the only African club affiliated with the world mountaineering body, the UIAA (Union Internationale des Associations d'Alpinisme). The club has 14 divisions in South Africa and Namibia and consists of more than 20 000 members (The Mountain Club of South Africa, n.d). All of the MCSA members have access to mountaineering activities such as rock climbing and hiking and are involved in the conservation of mountainous areas in South Africa, mountain search and rescue missions, training, and obtaining access to land that are ideal for mountaineering purposes.

The research participants were sampled at various rock climbing “meets” or gatherings in the greater Gauteng, North-West and Limpopo areas. These areas included King’s Kloof in Strubensvalley, Gauteng; Chospille in Magaliesberg, North-West province; and Waterval Boven in Limpopo. In addition, research participants were interviewed at the City Rock climbing gym in Randburg, Gauteng. The sample frame included males and females of 18 years and older and climbers of all sub-disciplines and grade abilities.

3.3.3 Description of Sample

The sample consisted of 70 participants who are members of the Mountain Club of South Africa and who participate in the sport of rock climbing. The biographic and demographic profiles of these participants are outlined below.

3.3.3.1 Age of the participants

Figure 3.1 illustrates that the participants were between 18 and 63 years old. On average the participants were *M* = 32.9 years of age with a standard deviation of *SD* = 11.056. More than half of the participants (71.4%) were younger than 39 years of age. The median age was 30.

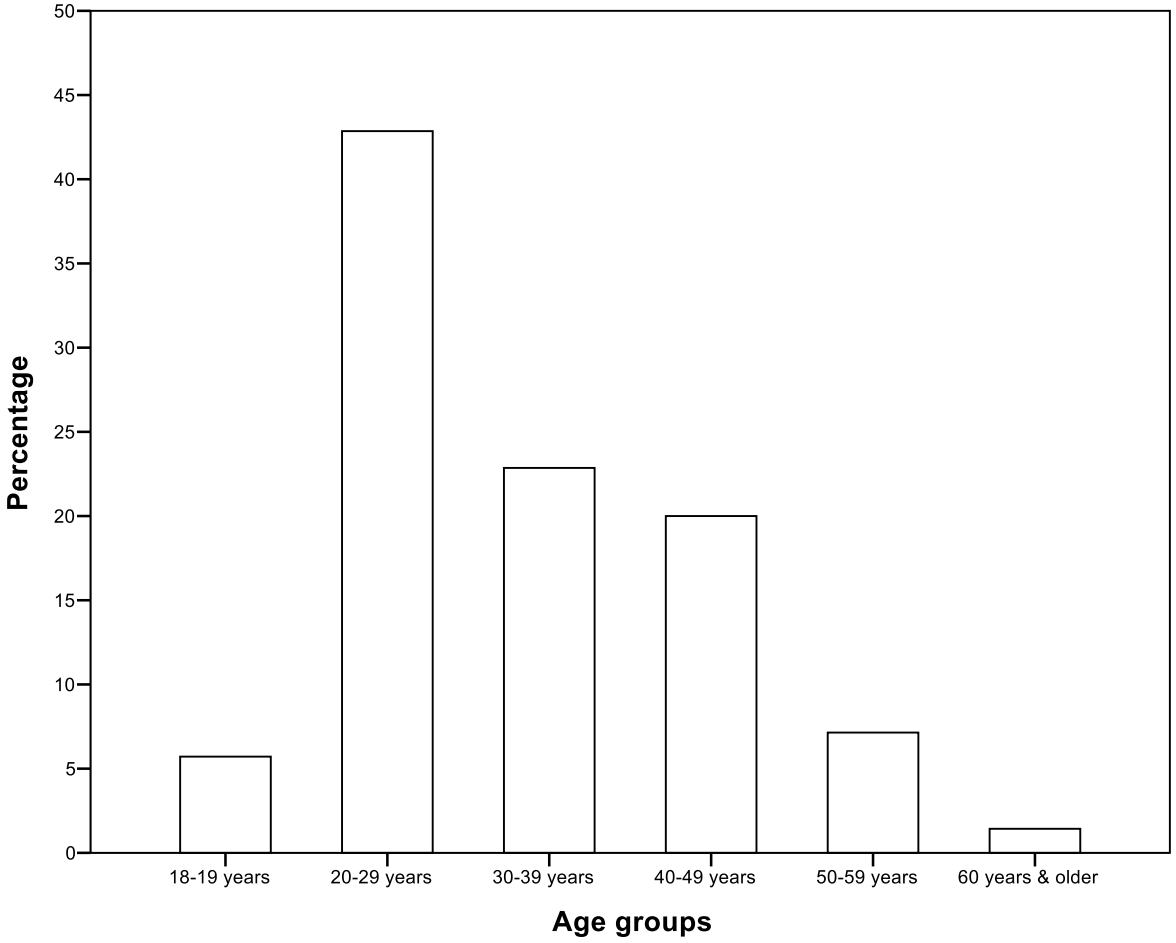


Figure 3.1: Age of participants

3.3.3.2 Sex of the participants

It is clear that most of the participants 60% (*n* = 42) were male and 40% (*n* = 28) were female.

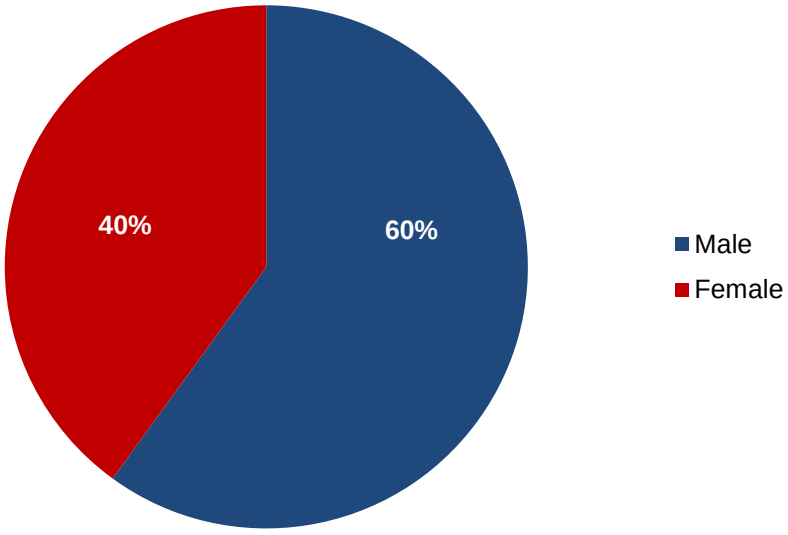


Figure 3.2: Sex of participants

3.3.3.3 Race of the participants

The majority of the participants were White (*n* = 65). There were three participants who refused to disclose their ethnicity or selected *other*, one Black and one Indian respondent.

3.3.3.4 Province in which the participants reside

All of the participants live in the Gauteng province.

3.3.3.5 Top three sports/activities that the participants participate in

The majority of the participants participate in rock climbing as one of their top three sports/activities (94.3%). 26% of the participants also hike, 16% run, 11% participate in mountain biking, and 10% do yoga as one of their top three sport/activities.

3.3.3.6 Frequency of rock climbing of the participants

Most of the participants (66%) participate in rock climbing at least once a week and 11% climb more than once a week. Figure 3.4 also shows that 13% climb once a month, 1% once in three months, 1% once in six months, and 7% once a year.

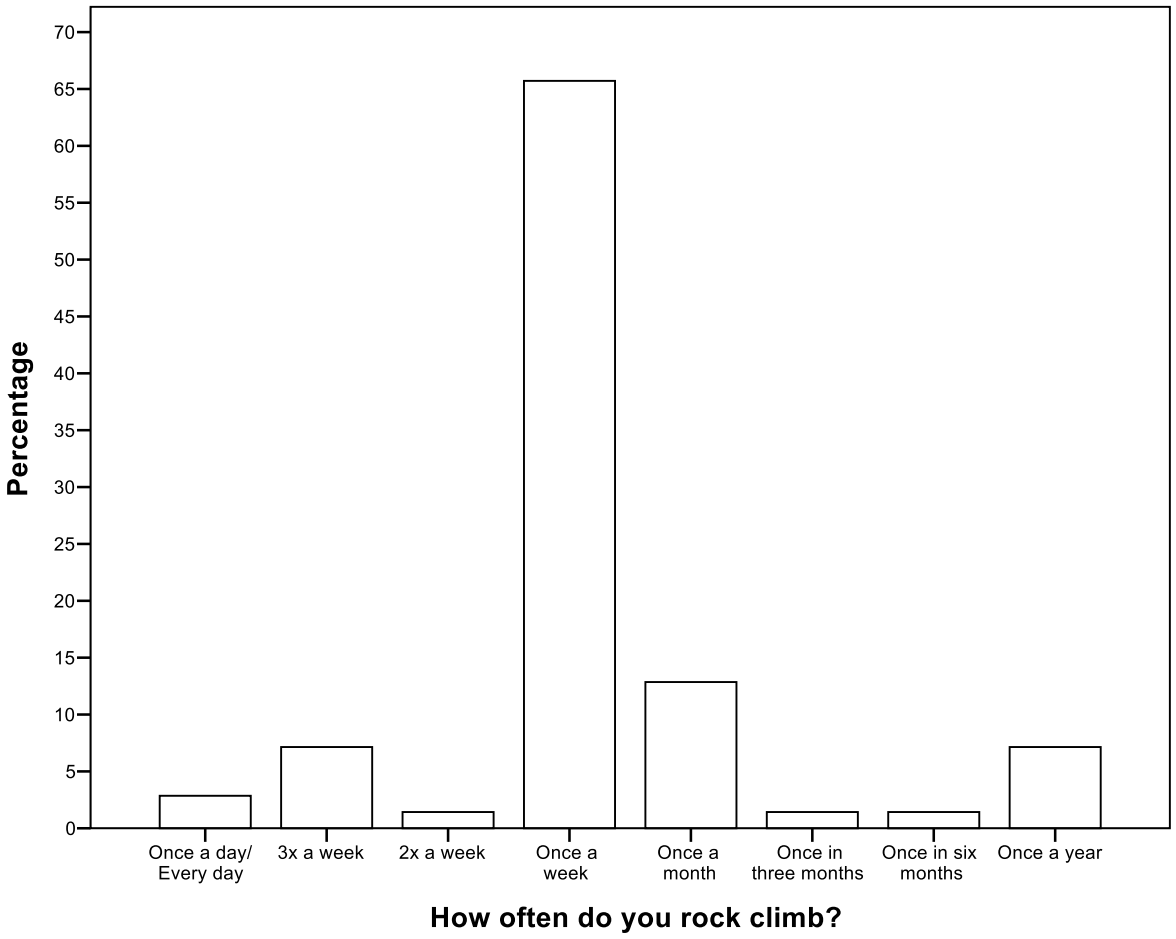


Figure 3.4: Frequency of rock climbing

3.3.3.7 Rock climbing ability of the participants

When using the UIFF grading scale (see Chapter 2, section 2.5.1 Grading scales for rock climbing), the average self-reported rock climbing ability grade of the participants is *M* = 19, with a standard deviation of *SD* = 3.8. The lowest self-reported ability grade was 5.5 and the highest 29. Figure 3.5 below illustrates the rock climbing ability of the participants by sex. It is clear that the average self-reported rock climbing ability grade of males (20) is higher than females (18). Figure 3.6 shows that participants between 18 and 19 years of age have the highest self-reported rock climbing ability grade.

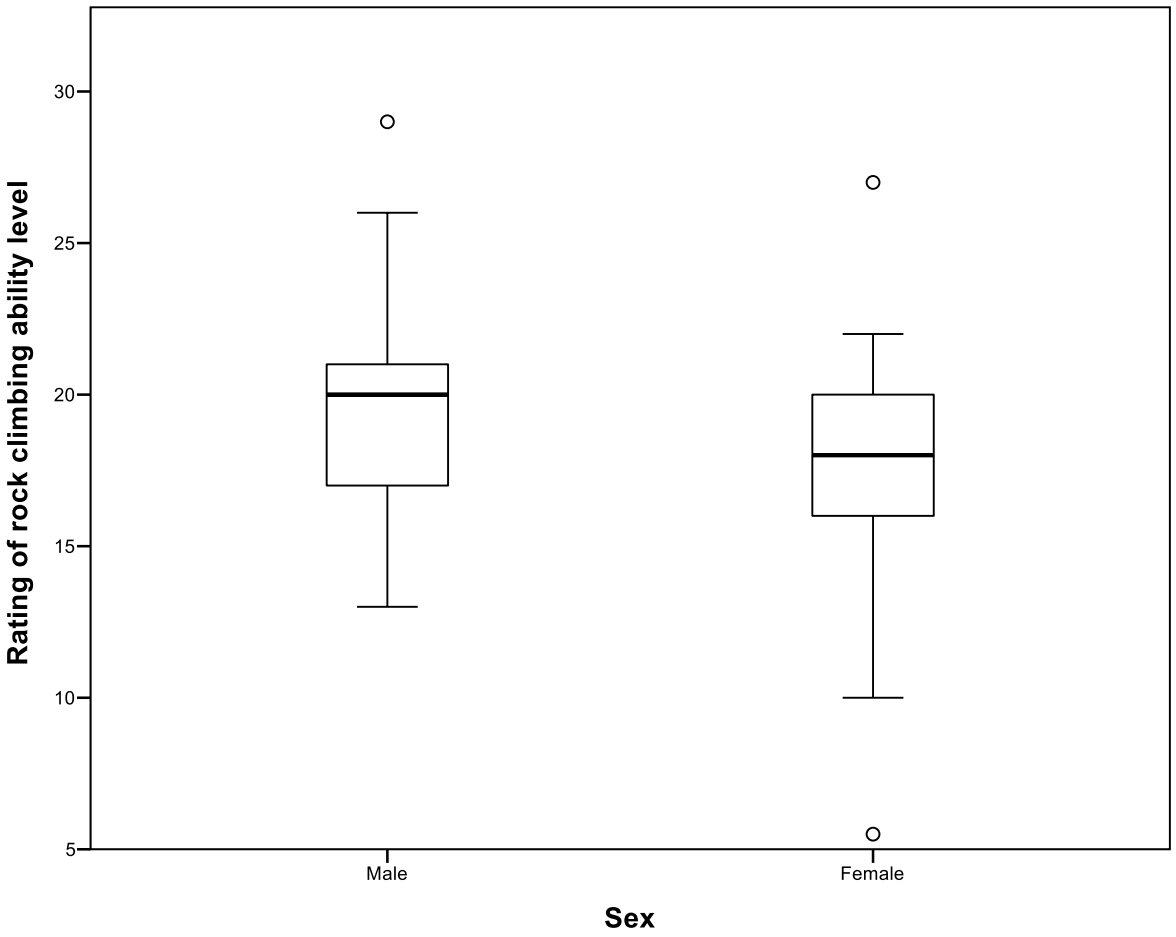


Figure 3.5: Self-reported rock climbing ability grade by sex

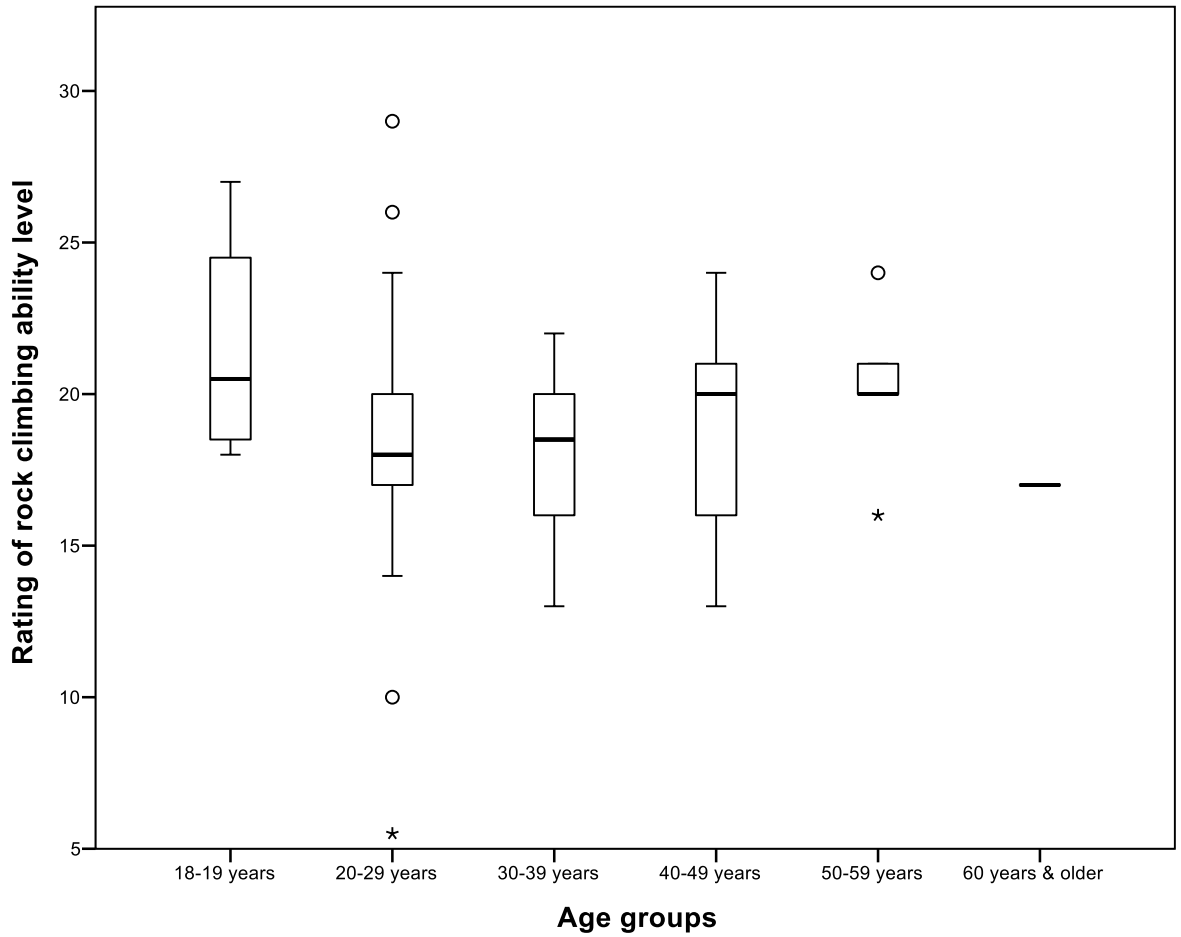


Figure 3.6: Self-reported rock climbing ability grade by age group

3.3.3.8 Period that participants have been involved in rock climbing

The participants have been climbing for *M* = 6.2 years on average. The minimum time was 0.8 years and the longest 40 years with a standard deviation of *SD* = 8.7 years.

3.3.3.9 Type of rock climbing of the participants

Figure 3.7 illustrates that 98% of the participants participate in sport climbing. In addition, 30% of the participants partake in bouldering and 20% traditional climbing. Lastly, 4% of the participants did solo climbing.

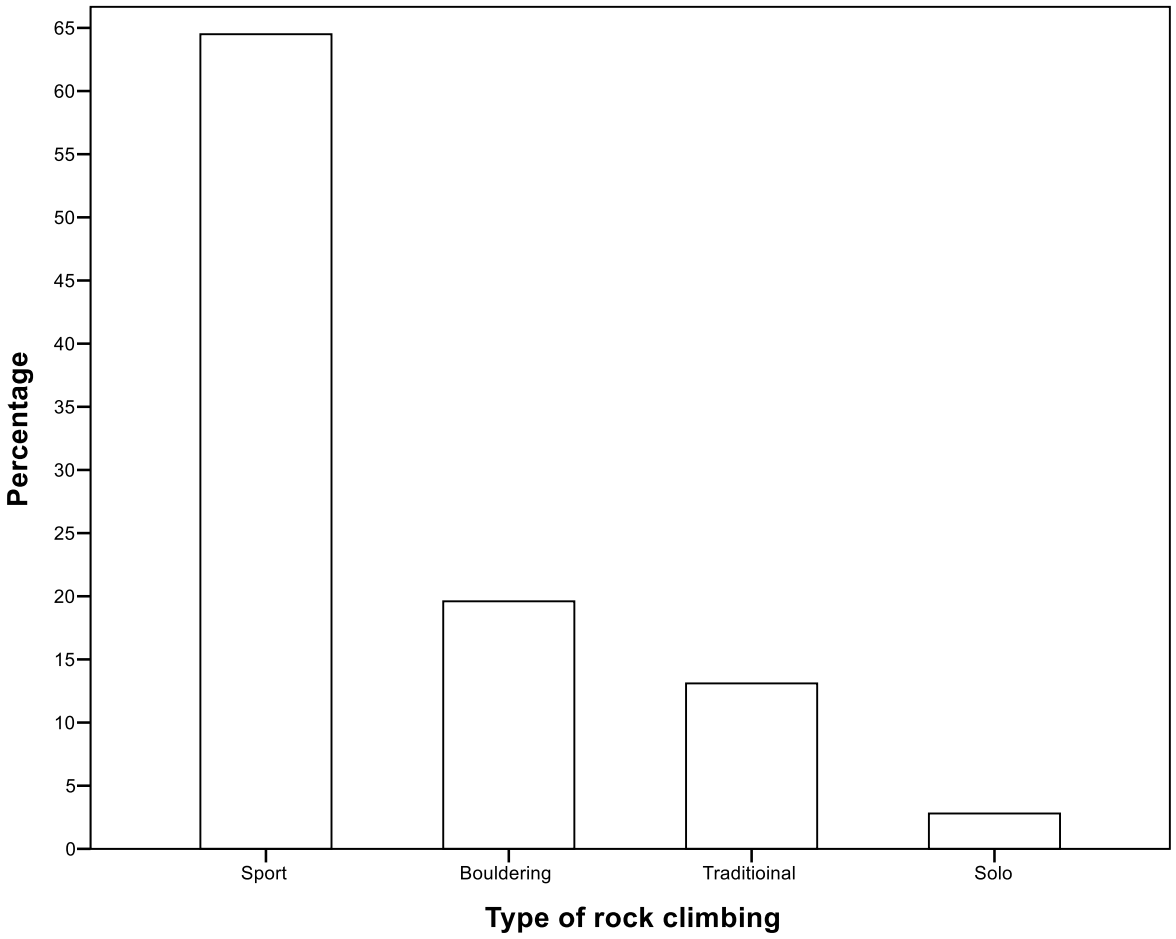


Figure 3.7: Sub-discipline of rock climbing

3.3.3.10 Number of acute injuries of the participants

Acute injuries refer to injuries that lead to significant trauma and require hospitalisation (Woodman et al., 2013). 10% of the participants have previously experienced at least one acute injury and 1.4% at least three of these injuries.

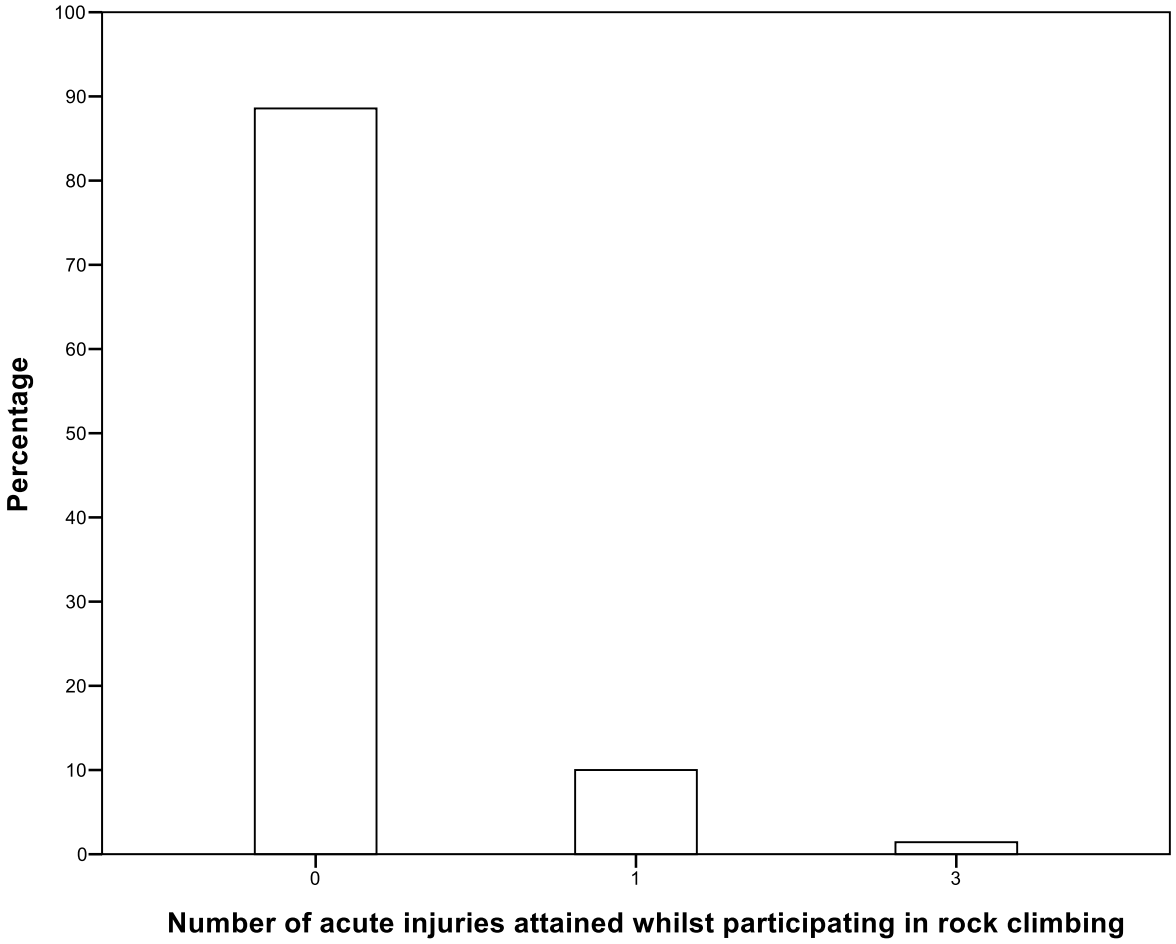


Figure 3.8: Number of acute injuries sustained during rock climbing.

3.3.3.11 Number of chronic injuries of the participants

Chronic injuries refer to stress fractures or tendonitis obtained during rock climbing (Woodman et al., 2013). Only 17.2% of the participants have experienced a chronic injury. When assessing the number of chronic injuries obtained, 5.7% of the participants mentioned that they have experienced at least 1 of these injuries. 2.9% of the participants have experienced 2 injuries, 2.9% 3 injuries, 2.9% 4 injuries and 2.8% of the participants have experienced 6 injuries.

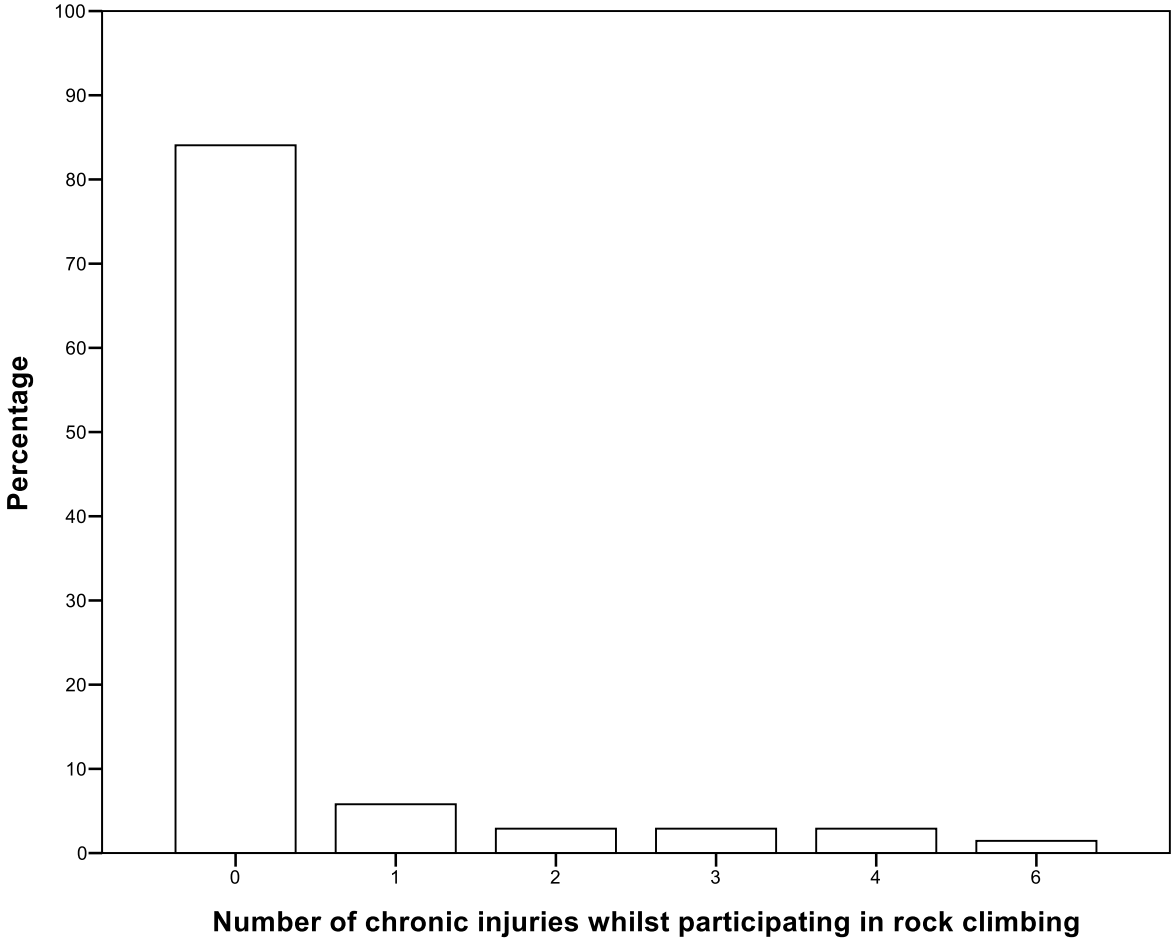


Figure 3.9: Number of chronic injuries sustained during rock climbing.

3.4. Measurement Instruments

The measurement instruments used in order to address the research objectives included a demographic questionnaire, the Risk Taking Inventory and the Sensation Seeking Scale-V. The questionnaires were standardised and acceptable for use with the South African population. Next, each of the measurement instruments will be discussed.

3.4.1. Demographic questionnaire

The demographic questionnaire (see Appendix A) used in the current research study was designed based on the demographic questionnaire used by Woodman et al. (2013). The questionnaire included questions pertaining to the demographics of the participants such as age, gender, race and province of residence. It furthermore included the top three sports/activities that the participants engage in. Following these questions, a set of questions pertaining to rock climbing were asked. These included the frequency of climbing, the ability level of the climbers based on the standard grade level, the number of years that they have been climbing, and the type of climbing/sub-discipline of rock climbing such as bouldering or top roping. The participants were further asked to state the number of injuries that they obtained while climbing, ranging from acute injuries (significant trauma, required hospitalization), to common injuries (sprains, fractures, cuts, bruising).

3.4.2 Risk Taking Inventory (RTI)

The second measurement instrument that was administered was the Risk Taking Inventory developed by Woodman et al. (2013) (see Appendix B). The Risk Taking Inventory provides insight into the extent to which high risk sports participants are viewed as a homogenous group of risk takers across and within sports. The Risk Taking Inventory was designed to assess the extent to which a person is a Deliberate or Precautionary Risk Taker. It consists of seven items across the two factors - Deliberate and Precautionary Risk Taking behaviour. This assessment measure is based on a five point scale with items being rated as *Never, Rarely, Sometimes, Often* and *Always.*

The Risk Taking Inventory was tested and found to be a valid measure of risk taking. Four separate studies were conducted to assess the validity of the Risk Taking Inventory (Woodman et al., 2013). The first study was conducted with 336 individuals who engaged in high-risk sports such as mountaineering and rock climbing. Woodman et al. (2013) reported alpha values of $\alpha = 0.69$ for Deliberate Risk Taking and $\alpha = 0.73$ for Precautionary Behaviour

and composite reliability for Deliberate Risk Taking as α = 0.78 and α = 0.71 for Precautionary Behaviour. The RTI is the only valid measure of risk taking behaviour and attitudes toward high risk sports to date. Previous assessment measures did not take into account actual risk taking behaviour but focused on attitudes towards risk. The researcher obtained permission from Professor Tim Woodman, of the Bangor University in the UK, to make use of the Risk Taking Inventory (see Appendix C).

Due to the few items included in the Precautionary Behaviour and Deliberate Risk taking subscales, inter-item correlations were used to assess reliability (Pallant, 2010). According to Piedmont (2014) the inter-item correlation coefficient assesses how related the score of one item is to scores on the other items in a scale. If the average inter-item correlation scores are between .20 and .40, the items are homogenous and contain unique variance. Scores below .20 indicate that the items may not represent the same content and values above .40 indicate that the construct is only partially measured. Table 3.1 presents the *Inter-Item Correlation Matrix* for the Deliberate Risk Taking subscale:

Table 3.1: Inter-Item Correlation Matrix for the Deliberate Risk Taking subscale

	RTI 1: I deliberately put myself in danger.	RTI 3: It's like gambling, you can't win unless you try.	RTI 5: I actively seek out dangerous situations.
RTI 1: I deliberately put myself in danger.	1.000	.104	.610
RTI 3: It's like gambling, you can't win unless you try.	.104	1.000	.083
RTI 5: I actively seek out dangerous situations.	.610	.083	1.000

Table 3.2: Inter-Item Correlation Matrix for the Precautionary Behaviour subscale

	RTI 2: I take time to check conditions (e.g. weather).	RTI 4: I check any gear/equipment that I borrow.	RTI 6: I am aware of the nearest help and first aid.	RTI 7: I take time to check for potential hazards.
RTI 2: I take time to check conditions (e.g. weather).	1.000	.160	.274	.332
RTI 4: I check any gear/ equipment that I borrow.	.160	1.000	.251	.329
RTI 6: I am aware of the nearest help and first aid.	.274	.251	1.000	.575
RTI 7: I take time to check for potential hazards	.332	.329	.575	1.000

The Precautionary Behaviour subscale has more acceptable consistency levels than the Deliberate Risk Taking subscale. To deal with the low internal consistency of the RTI, the researcher converted the results to Z-scores, which is discussed in more detail in Chapter 4.

3.4.3 The Sensation Seeking Scale-V (SSS-V)

The last assessment measure that was used to collect the data was the Sensation Seeking Scale-V (SSS-V) (see Appendix D). The first sensation seeking scale developed by Zuckerman, Kolin, Price and Zoob in 1964 assessed participants' test responses to sensory deprivation (Zuckerman, Eysenck & Eysenck, 1978). The assessment measure was based on the theory that people have different optimal levels of arousal and stimulation and that sensation seeking could explain the different reactions that participants had to sensory

deprivation. The sensation seeking scale included a list of items that either expressed preference for or avoidance of dangerous sports, a need for general excitement and attraction to new and unfamiliar situations, preference for irregularity and exciting situations. The 4 factors identified were Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (Dis) and Boredom Susceptibility (BS). Over the years multiple versions of the sensation seeking scale were developed and the latest, the Sensation Seeking Scale-V, includes the same 4 subscales as mentioned above (Zuckerman, 1983). These subscales will now be discussed.

1. The Thrill and Adventure Seeking subscale of the assessment measure assesses the desire to engage in sports or physical activities that contain an element of physical danger or risk. By engaging in these activities the person will experience unusual sensations. A correlation between Thrill and Adventure Seeking and participation in risky sport can point to a general desire to participate in other risky sports as well (Zuckerman, 1983). A study conducted by Goma-i-Freixanet (2004) showed that Thrill and Adventure Seeking is a typically characteristic of medium or high risk sports. Low risk sports on the other hand score low on the Thrill and Adventure Seeking subscale.

2. The Experience Seeking subscale measures a desire for stimulation and new experiences through the mind and all the senses and to live an unconventional lifestyle (drugs, music, art, travel). Experience Seeking is a characteristic of high risk sports and relates to seeking experiences through the mind and senses (Goma-i-Freixanet, 2004). Rock climbing as such has been described as a sport that requires intense physical and mental effort (Max, 2016) and therefore includes a component of Experience Seeking.

3. Disinhibition is the third subscale of the Sensation Seeking Scale-V and measures the need for social stimulation through disinhibited behaviour such as sex, parties, social drinking and gambling. Disinhibition is a characteristic of high, medium and low risk sports due to the social nature of many types of sport. It is therefore more dependent on the individual's characteristics and whether they enjoy engaging in social activities or not. Disinhibition includes meeting new people, celebrating successes, being non-conformist and unconventional (Goma-i-Freixanet, 2004). When looking back at rock climbing over the years, it can be described as non-conformist and unconventional, as was typical of the 1950'5 and 1960's *Hippy* era.

4. The Boredom Susceptibility subscale measures an aversion to repetitive environments or un-stimulating persons, restlessness and boredom when constancy is unavoidable. There is a significant difference in Boredom Susceptibility scores between high and low risk sports but not between high and medium risk sports (Goma-i-Freixanet, 2004).

The Sensation Seeking Scale-V is a measure of risk taking behaviour and consists of 40 items with two forced-choice response categories for each item (Zuckerman, 1979). The four subscales can be used to identify sensation seeking among participants even if they have never engaged in a certain activity as it forces them to imagine having participated in it. Grey and Wilson (2007) conducted a study to assess the validity of the SSS-V for the 21st century and found that 19 of the items were out-dated and as such removed these items. These authors found alpha levels on the Thrill and Adventure Seeking subscale of $\alpha = 0.91$, Experience Seeking $\alpha = 0.80$, Disinhibition $\alpha = 0.84$ and Boredom Susceptibility $\alpha = 0.74$. As such the overall reliability of the SSS-V is good and yields valid results. Cronbach alpha was run to determine the alpha level for this study. The current study's alpha level for Thrill and Adventure Seeking was $\alpha = 0.42$, for Experience Seeking $\alpha = 0.72$, Boredom Susceptibility $\alpha = 0.65$, and Disinhibition $\alpha = 0.72$.

3.5 Data collection procedure

The researcher first requested permission from the Mountain Club of South Africa (MCSA) to conduct the study amongst its members (See Appendix E). When permission was granted, the MCSA posted a message on their website to inform the members of the research study and its purpose. The researcher then requested permission from the various MCSA climbing leaders to join them and the MCSA members on their climbing meets/gatherings at the various climbing locations. Each of these leaders gave the researcher permission to conduct the research. In addition, permission was asked from CityRock, a climbing gym based in Randburg, Gauteng, to conduct interviews with voluntary participants at the gym. Upon arrival at the climbing location all participants signed the visitors' book/indemnity form as part of the normal regulation. At the gym, members signed an indemnity form when they signed up. On the day that the MCSA scheduled the climbing, the researcher joined the MCSA, introduced the study and its purpose to the members and asked them for voluntary participation. The same procedure was followed at the City Rock gym in Randburg.

The researcher assessed the participants in their natural sporting environment and the activity took place as part of the respondent's routine practice. The data was only

collected on weekends at the MCSA locations since the MCSA has come to an agreement with the owners of the various properties to avail the site to its club members. Data collection at the gym took place during the week and over weekends. The participants used their own equipment or rented equipment from the MCSA leaders/gym and conducted their normal safety checks before ascending each climb.

Each MCSA member who agreed to participate in the study completed a paper based informed consent form after the researcher verbally communicated the purpose of the study and informed the participants of their rights. The participants were given a clipboard and stationery to complete the questionnaires.

As soon as the participants completed the consent form, they were asked to select a random number from a list of randomly generated numbers. This number was then used on each of the questionnaires to ensure anonymity. The researcher explained the purpose of the assessment measures and introduced the response formats (5 point scale and forced choice response formats). The participants then completed the demographic questionnaire, the Risk Taking Inventory and the Sensation Seeking Scale-V. The order in which the assessment measures were administered was randomised to remove any order bias. The responses were then captured on a computer by the researcher ex post facto.

3.6 Ethical considerations

According to Gravetter and Forzano (2012) and Sarantakos (2005), quantitative research should adhere to and uphold strict ethical standards. The guidelines proposed by the Health Professions Council of South Africa (2004) were adhered to in the current research study. Informed consent was obtained from each potential participant before the study commenced (See Appendix F). In accordance with the requirements, the informed consent form provided the potential participants with the aim of the study, a brief description of the sequence of events and the expected duration of participating in the study (Shadish, Cook, & Campbell, 2002). In addition, the participants' rights were fully outlined and explained. Participation in the study was completely voluntary and the participants could refuse to participate or withdraw from the study at any point during the process without any negative repercussions. The confidentiality of the results was also clearly explained to the participants. Furthermore, the informed consent form stated that the data would be used for current and future research purposes and contact details for any further queries, or about the participant's rights was provided. The participants signed the informed consent form, acknowledging that they were willing to participate and understood their rights, the aim and

procedures of the study. The informed consent form was handed in with the three fully completed questionnaires. The data was treated confidentially in that no names or identifying criteria was linked to a participant. Randomised respondent numbers were generated and given to each participant (Maree, 2010). This identifying number was included on all completed assessment measures, except the informed consent form. The researcher met the participants in their natural sporting environment. There was no form of physical, psychological or legal harm, victimisation, coercion or discrimination as a result of this study. Only members of the MCSA/City Rock were asked to participate in the study as they have been through basic and/or advanced training in rock climbing and the safety precautions that have to be taken during the activity. The environment in which the participants climbed was one of practicing the sport, learning to rock climb or as a pastime and not in a competitive environment. Participants could withdraw from the study at any time without any negative consequences. Furthermore, the researcher did not cheat, trick, deceive or insult the participants. All participants were respected and their dignity and worth upheld at all times to protect their human rights. The participants were not offered any incentives to participate in the study and the researcher adhered to the highest levels of professional competence that complies with best practice standards. The data will be stored in the Department of Psychology for a period of 15 years.

3.7 Data analysis

Upon completion of the data collection phase, the Excel data was imported into SPSS Version 23®. Descriptive statistics in the form of frequencies and cross tabulations were computed. These were used to categorize participants as either Deliberate or Precautionary Risk Takers. Since the data was not normally distributed, non-parametric statistics in the form of Friedman's two way analysis of variance and the Mann-Whitney U tests were used to determine variance between the Sensation Seeking Scale-V constructs, and if Deliberate or Precautionary Risk Takers differ on the subscales of the Sensation Seeking Scale-V. Since the Risk Taking Inventory and Sensation Seeking Scale-V only categorised participants, correlational analysis in the form of Spearman's rho was computed to determine if there are relationships between the type of risk takers and the sensation seeking constructs that they associate with.

3.8 Conclusion

This chapter described the methodology that was used to obtain the research aims and objectives of the study. The researcher made use of a non-probability, purposive sampling method to recruit 70 participants. Participation in the study was completely voluntary and no deception was used. The sample consisted of males and females between 18 and 63 years of age. The sample comprised only of Gauteng residents. Since the participants were only from Gauteng and mainly White, these characteristics do not mirror the South African population. The exploratory research design does not lend itself to the generalisation of the results to the broader population; therefore the results should be interpreted with caution. The required ethical considerations have been implemented to ensure pre-and post-data collection accuracy and adherence to the HPCSA's standards. The methodology was able to provide the necessary requirements for explaining the associations of rock climbers with sensation seeking and to differentiate between Deliberate and Precautionary Risk Taking rock climbers. Chapter 4 outlines the results of the study.

CHAPTER 4: RESULTS

4.1 Introduction

The fourth chapter deals with the results of the study. It outlines and displays the analyses conducted on the data. This section is divided into different components including the descriptive statistics for the Risk Taking Inventory, and the Sensation Seeking Scale-V, Friedman's two-way analysis of variance, Independent Samples Mann-Whitney U Tests and correlation statistics. Firstly, the standardisation of the Risk Taking Inventory and the descriptive statistics will be discussed.

4.2 Standardisation of the Risk Taking Inventory and descriptive statistics

The Risk Taking Inventory consisted of only 7 items and the number of questions for each of the sub-scales (Deliberate Risk Taking and Precautionary Behaviour) was unevenly distributed. The inter-item correlations calculated for the scale (see Table 3.1) revealed that the scale was not as reliable as one would have expected. Thus, in order to compare the scores of the two groups, the scores were standardised by reverting them to z-scores. The next step involved classifying the participants as Deliberate Risk Takers or Precautionary Behaviourists. According to the original calculation of the Risk Taking Inventory categories, the questions linked to each construct were summed. Each respondent would therefore have two summed values, one for each category. Based on the highest value, the respondent would either be grouped into the Deliberate Risk Taking or Precautionary Behaviour group. In the end, 33 participants were identified as Deliberate Risk Takers and 37 as Precautionary Behaviourists.

Table 4.1 and 4.2 contains the descriptive statistics that were obtained for the two groups.

Table 4.1: Mean, Median, Standard Deviation, Range, Minimum and Maximum scores for the Deliberate Risk Taking group

N	Mean	Median	SD	Range	Minimum	Maximum
33	0.59	0.400	0.920	3.60	-1.40	2.20

Table 4.2: Mean, Median, Standard Deviation, Range, Minimum and Maximum scores for the Precautionary Behaviour group

N	Mean	Median	SD	Range	Minimum	Maximum
37	0.675	0.484	0.556	1.77	-0.22	1.54

Because of the few participants in each group, a decision was made to conduct non-parametric statistics when conducting subsequent analyses. The descriptive statistics for the Sensation Seeking Scale-V will subsequently be discussed.

4.3 Descriptive statistics for the Sensation Seeking Scale-V

The Sensation Seeking Scale-V consists of 40 paired items and 4 subscales including Thrill and Adventure Seeking, Experience Seeking, Disinhibition and Boredom Susceptibility. Of the 80 listed items, only 40 items are linked to one of the subscales and each subscale contains 10 items. Participants were forced to select the statement from the pair that best described themselves. In the event that the respondent never participated/engaged in an activity, they were asked to imagine what it would be like and provide an answer that bests represents their interpretation of the activity. If the response selected was linked to a subscale, it was given a value of 1. If the item was not linked to one of the four subscales, it was given a 0. The total was summed to obtain a score for each subscale and for the Total Sensation Seeking Scale. Table 4.3 highlights the results for the Total Sensation Seeking Scale. The descriptive statistics were calculated on 69 participants since one respondent did not complete the entire questionnaire. The mean score was *M* = 22.14, the minimum score 7 and the maximum score 35 out of 40.

Table 4.3: Mean, Median, Standard Deviation, Range, Minimum and Maximum scores for the Total Sensation Seeking Scale

N	Mean	Median	SD	Range	Minimum	Maximum
69	22.14	22.00	6.10	28	7	35

The mean score for the Thrill and Adventure Seeking Scale was *M* = 7.46, with a standard deviation of *SD* = 1.62 as displayed in Table 4.4. The minimum score was 1 and the maximum score 10 out of 10.

Table 4.4: Mean, Median, Standard Deviation, Range, Minimum and Maximum scores for the Thrill and Adventure Seeking subscale

N	Mean	Median	SD	Range	Minimum	Maximum
69	7.46	8.00	1.62	9	1	10

Table 4.5 shows that the mean score for the Experience Seeking subscale was *M* = 6.38, with a standard deviation of *SD* = 2.05, a minimum score of 2 and a maximum of 10.

Table 4.5: Mean, Median, Standard Deviation, Range, Minimum and Maximum scores for the Experience Seeking subscale

N	Mean	Median	SD	Range	Minimum	Maximum
69	6.38	6.00	2.05	8	2	10

The results for the Disinhibition subscale revealed a mean score of *M* = 4.42, with a standard deviation of *SD* = 2.48 and a range of 9.

Table 4.6 Mean, Median, Standard Deviation, Range, Minimum and Maximum scores for the Disinhibition subscale

N	Mean	Median	SD	Range	Minimum	Maximum
69	4.42	4.00	2.48	9	0	9

Lastly, the results of the Boredom Susceptibility subscale in Table 4.7, illustrates that the mean score for the subscale was *M* = 3.88, with a minimum score of 0 and a maximum score of 9.

Table 4.7: Mean, Median, Standard Deviation, Range, Minimum and Maximum scores for the Boredom Susceptibility subscale

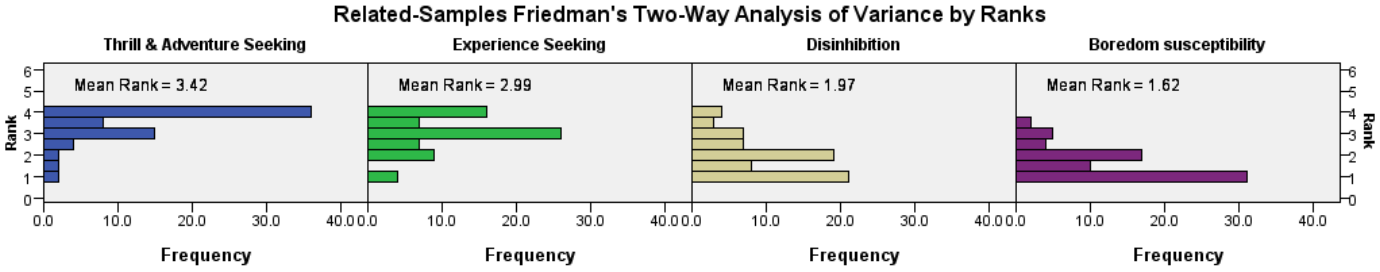
N	Mean	Median	SD	Range	Minimum	Maximum
69	3.88	4.00	2.32	9	0	9

The test of normality for the Sensation Seeking Scale-V revealed that not all the subscales were normally distributed. Hence non-parametric statistics were also conducted on analyses involving the subscales

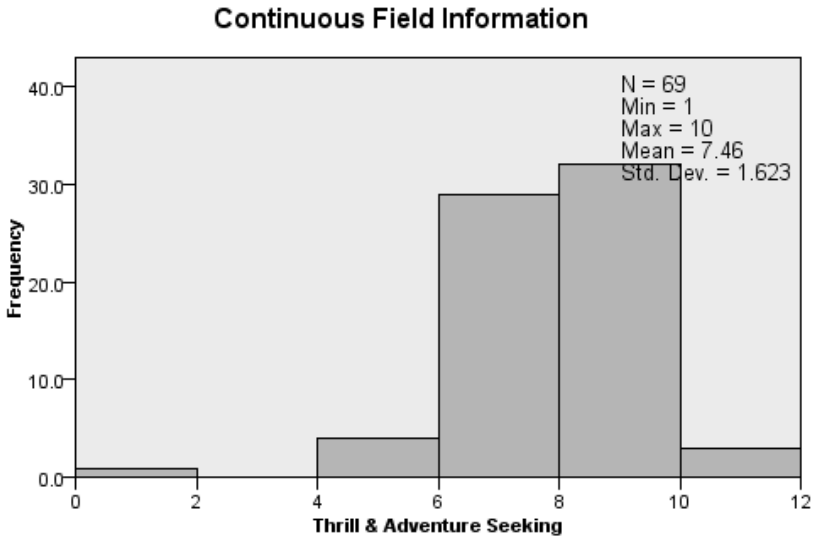
4.4 Related samples Friedman's two-way analysis of variance for the four Sensation Seeking Scale-V constructs

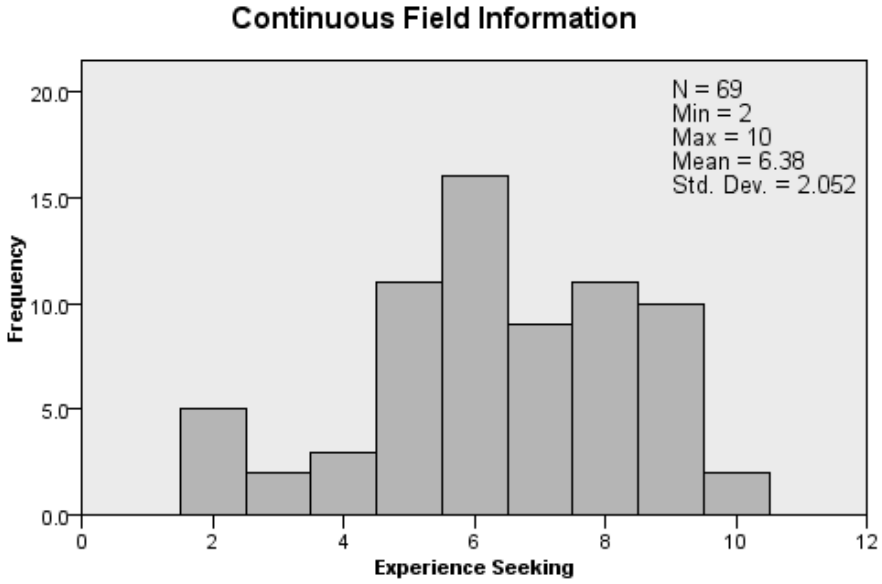
Non-parametric two-way analysis of variance was conducted in order to establish if any significant differences occurred between the four Sensation Seeking Scale-V constructs. This method is used to measure the same sample under different conditions (Pallant, 2010). Post hoc pairwise comparisons were made to determine which two or more subscales differed. A Bonferroni-adjustment was used to determine the p-value according to which significance was determined.

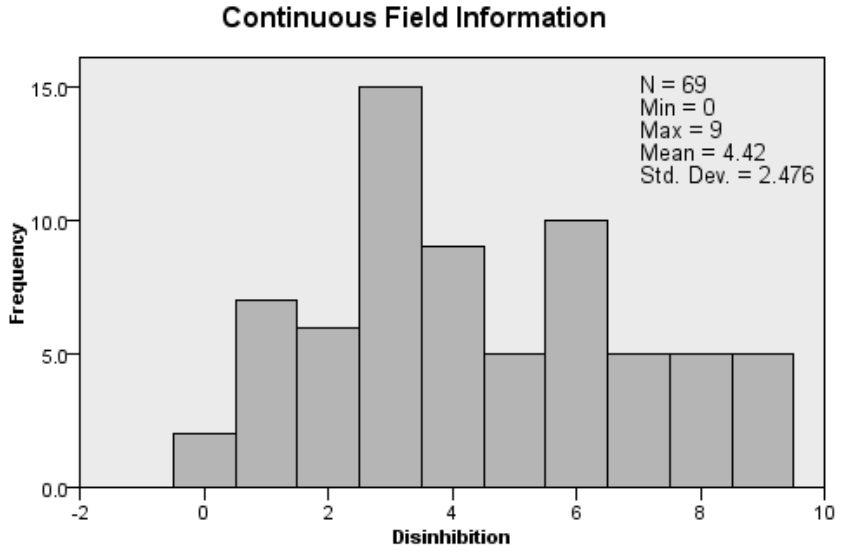
Table 4.8: Friedman's two-way analysis of variance to test for significant differences between the subscales of the Sensation Seeking Scale-V

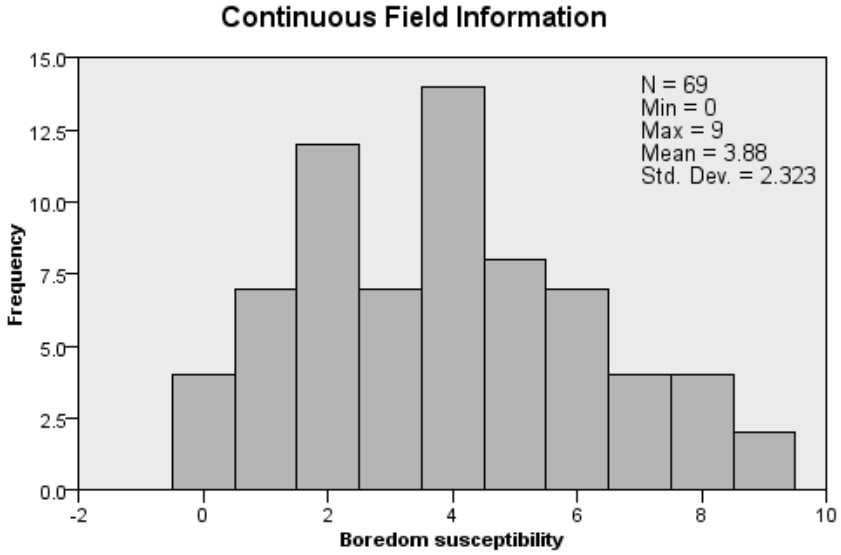


Total N	69
Test Statistic	94.684
Degrees of Freedom	3
Asymptotic Sig. (2-sided test)	.000

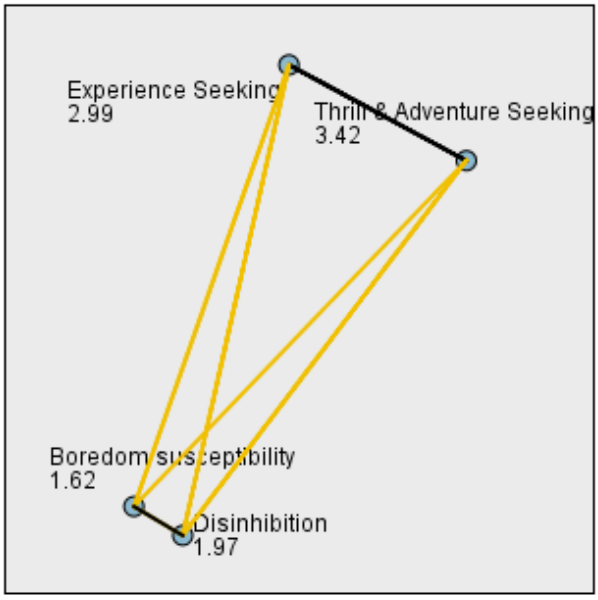

Continuous Field Information
N = 69
Min = 1
Max = 10
Mean = 7.46
Std. Dev. = 1.623
Frequency
Thrill & Adventure Seeking


Continuous Field Information
N = 69
Min = 2
Max = 10
Mean = 6.38
Std. Dev. = 2.052
Frequency
Experience Seeking


Continuous Field Information
N = 69
Min = 0
Max = 9
Mean = 4.42
Std. Dev. = 2.476
Frequency
15.0
10.0
5.0
0.0
-2
0
2
4
6
8
10
Disinhibition


Continuous Field Information
N = 69
Min = 0
Max = 9
Mean = 3.88
Std. Dev. = 2.323
Frequency
15.0
12.5
10.0
7.5
5.0
2.5
0.0
-2
0
2
4
6
8
10
Boredom susceptibility

Pairwise Comparisons



Each node shows the sample average rank.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Boredom susceptibility-...	.348	.220	1.583	.114	.681
Boredom susceptibility-...	1.362	.220	6.198	.000	.000
Boredom susceptibility-Thrill & ...	1.797	.220	8.176	.000	.000
Disinhibition -Experience ...	1.014	.220	4.616	.000	.000
Disinhibition -Thrill & Adventure ...	1.449	.220	6.594	.000	.000
Experience Seeking-Thrill & ...	.435	.220	1.978	.048	.287

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.
Significance values have been adjusted by the Bonferroni correction for multiple tests.

Figure 4.1: Pairwise comparisons

The results have shown that the scores related to Boredom Susceptibility (*Md* = 4.00) differed significantly from the scores for Thrill and Adventure Seeking (*Md* = 8.00; $p < 0.001$). Significant differences were also determined between the scores for Boredom Susceptibility (*Md* = 4.00) and the scores for Experience Seeking (*Md* = 6.00; $p < 0.001$). Scores with regards to Disinhibition (*Md* = 4.00) differed significantly from scores related to Experience Seeking (*Md* = 6.00; $p < 0.001$). Lastly it was found that the scores for Disinhibition (*Md* = 4.00) differed significantly from scores for Thrill and Adventure Seeking (*Md* = 8.00; $p < 0.001$).

Based on the results of the Friedman test described above, the following research hypotheses are accepted:

- There are significant differences between the scores of Boredom Susceptibility and Thrill and Adventure Seeking;
- There are significant differences between the scores of Boredom Susceptibility and Experience Seeking;
- There are significant differences between the scores of Disinhibition and Experience Seeking; and
- There are significant differences between the scores of Disinhibition and Thrill and Adventure Seeking.

4.5 Descriptive statistics for the Risk Taking Inventory and Sensation Seeking Scale-V

The next step of statistical analyses involved determining whether there are significant differences between the Precautionary and Deliberate Risk Taking groups when they are compared in terms of the subscales of the Sensation Seeking Scale-V. However, before the analysis was conducted, descriptive statistics were calculated for all constructs involved. The results are displayed in Table 4.9

Table 4.9: Mean, Median, Standard Deviation, Range, Minimum and Maximum scores for the Sensation Seeking Scale per Risk Taking category

	Risk Taking Group	Mean	Median	SD	Range	Min	Max
Total for Sensation Seeking Scale	Deliberate Risk Taking	23.97	24.00	6.03	27	7	34
	Precautionary Behaviour	20.47	19.00	5.74	27	8	35
Thrill and Adventure Seeking	Deliberate Risk Taking	7.55	8.00	1.90	9	1	10
	Precautionary Behaviour	7.39	7.00	1.34	5	5	10
Experience Seeking	Deliberate Risk Taking	6.58	6.00	1.94	8	2	10
	Precautionary Behaviour	6.19	5.00	2.16	8	2	10

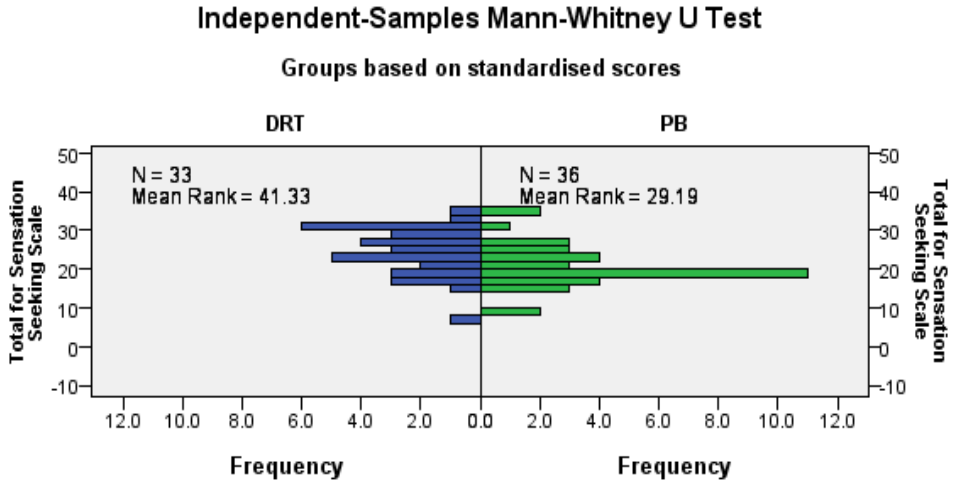
Disinhibition	Deliberate Risk Taking	5.24	6.00	2.40	8	1	9
	Precautionary Behaviour	3.67	3.00	2.33	9	0	9
Boredom Susceptibility	Deliberate Risk Taking	4.61	5.00	3.40	9	0	9
	Precautionary Behaviour	3.22	3.00	2.07	9	0	9

4.6 Independent samples Mann-Whitney U Test

The Mann-Whitney U test was conducted in order to assess for differences between the Deliberate Risk Taking group and the Precautionary Behaviour group on the subscales of the Sensation Seeking Scale-V. Pallant (2010) stated that the Mann-Whitney U test is a non-parametric alternative to the t-test for independent samples, and compares the medians of two groups (independent variables) with regards to a dependent variable.

However, before the two groups were compared with regards to the subscales of the Sensation Seeking-V scale, a Mann-Whitney U test was conducted to determine if the Deliberate Risk Taking group differs significantly from the Precautionary Behaviour group when the overall scores of the two groups on the Sensation Seeking Scale were compared.

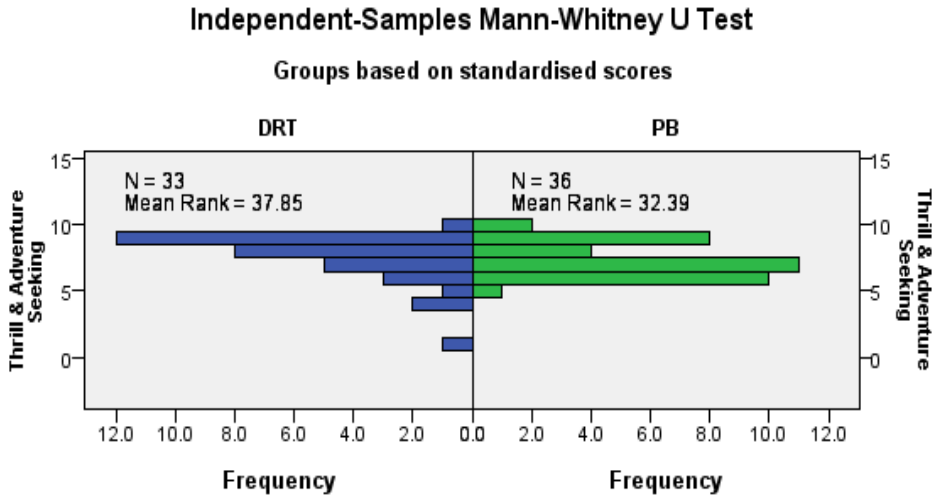
Table 4.10: Mann-Whitney U test for Total Sensation Seeking Scale



Total N	69
Mann-Whitney U	385.000
Wilcoxon W	1,051.000
Test Statistic	385.000
Standard Error	83.069
Standardized Test Statistic	-2.516
Asymptotic Sig. (2-sided test)	.012

Table 4.10 indicated that there are statistically significant differences between the Deliberate Risk Taking (*Md* = 24.00, *n* = 33) and Precautionary Behaviour groups (*Md* = 19.00, *n* = 36) on the Total Sensation Seeking Scale, *U* = 385.00, *z* = -2.516, *p* = 0.012. The Deliberate Risk Taking group measured higher on the overall score of the sensation seeking scale than the Precautionary Behaviour group. A medium effect size was obtained r = -0.30. Cohen (1988) defines effect sizes of .1 small, .3 medium and .5 large.

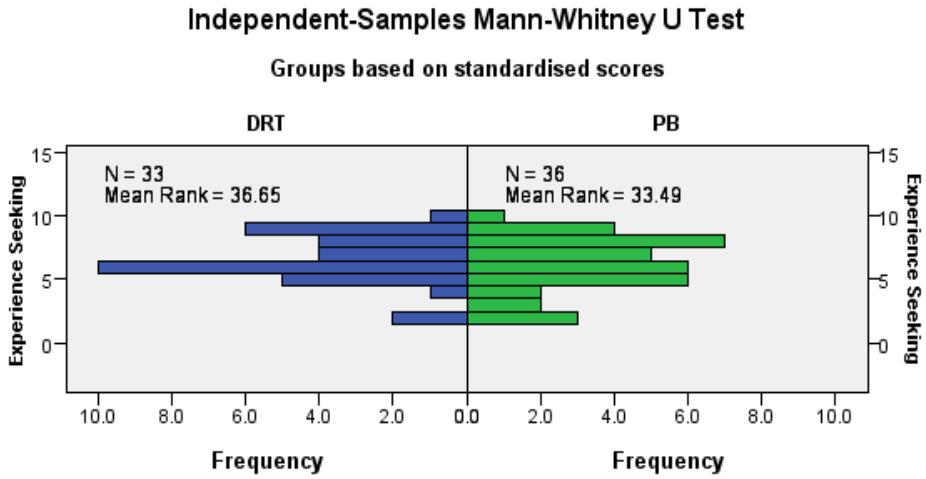
Table 4.11: Mann-Whitney U test for the Thrill and Adventure subscale



Total N	69
Mann-Whitney U	500.000
Wilcoxon W	1,166.000
Test Statistic	500.000
Standard Error	81.194
Standardized Test Statistic	-1.158
Asymptotic Sig. (2-sided test)	.247

Table 4.11 indicated that there are no statistically significant differences between the Deliberate Risk Taking (*Md* = 8.00, *n* = 33) and Precautionary Behaviour groups (*Md* = 7.00, *n* = 36) on the Thrill and Adventure Seeking subscale, *U* = 500.00, *z* = -1.158, *p* = 0.247.

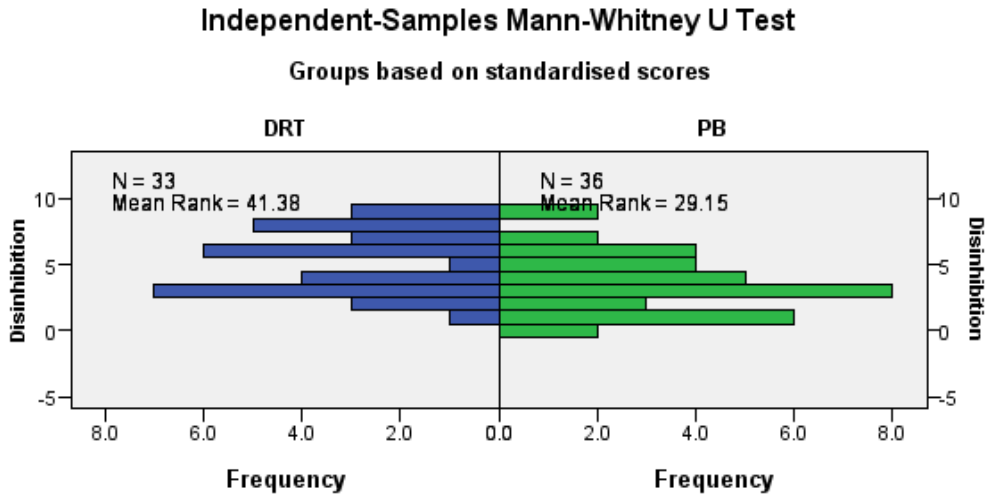
Table 4.12: Mann-Whitney U test for the Experience Seeking subscale



Total N	69
Mann-Whitney U	539.500
Wilcoxon W	1,205.500
Test Statistic	539.500
Standard Error	82.151
Standardized Test Statistic	-.663
Asymptotic Sig. (2-sided test)	.507

There are also no statistically significant differences between the Deliberate Risk Taking (*Md* = 6.00, *n* = 33) and Precautionary Behaviour groups (*Md* = 5.00, *n* = 36) on the Experience Seeking subscale, *U* = 539.50, *z* = -0.663, *p* = 0.507 as indicated by table 4.12.

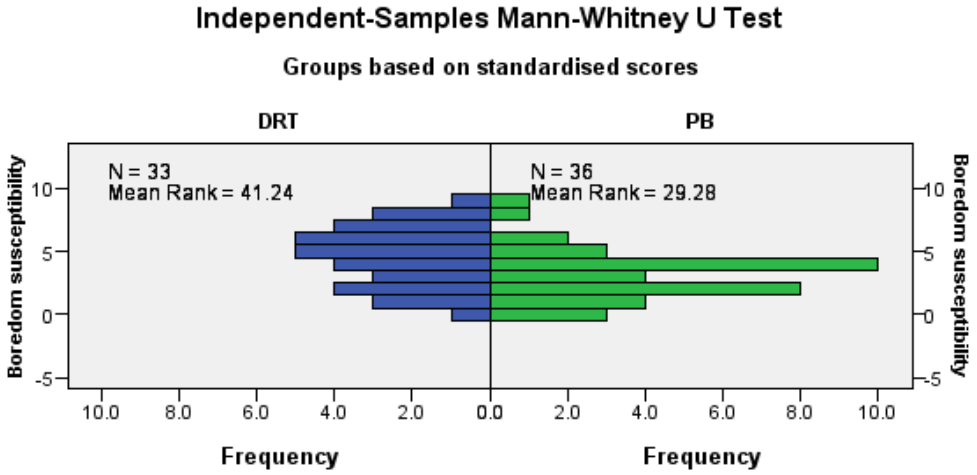
Table 4.13: Mann-Whitney U test for the Disinhibition subscale



Total N	69
Mann-Whitney U	383.500
Wilcoxon W	1,049.500
Test Statistic	383.500
Standard Error	82.470
Standardized Test Statistic	-2.552
Asymptotic Sig. (2-sided test)	.011

The Mann-Whitney U test, in table 4.13, revealed that there are statistically significant differences between the Deliberate Risk Taking (*Md* = 6.00, *n* = 33) and Precautionary Behaviour groups (*Md* = 3.00, *n* = 36) on the Disinhibition subscale, *U* = 383.50, *z* = -2.55, *p* = 0.011. The Deliberate Risk Taking group measured higher on Disinhibition than the Precautionary Behaviour group. A medium effect size was obtained, - r = 0.31.

Table 4.14: Mann-Whitney U test for the Boredom Susceptibility subscale



Total N	69
Mann-Whitney U	388.000
Wilcoxon W	1,054.000
Test Statistic	388.000
Standard Error	82.464
Standardized Test Statistic	-2.498
Asymptotic Sig. (2-sided test)	.012

Table 4.14 illustrated that there are statistically significant differences between the Deliberate Risk Taking (*Md* = 5.00, *n* = 33) and Precautionary Behaviour groups (*Md* = 3.00, *n* = 36) on the Boredom Susceptibility subscale, *U* = 388.00, *z* = --2.50, *p* = 0.012. The mean rank score for the Deliberate Risk Taking (41.24) was higher than the Precautionary Behaviour mean rank score (29.28). A medium effect size was obtained r = -.30.

Table 4.15: Hypothesis summary of the Mann-Whitney U test

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Thrill & Adventure Seeking is the same across categories of Groups based on standardised scores.	Independent-Samples Mann-Whitney U Test	.247	Retain the null hypothesis.
2	The distribution of Experience Seeking is the same across categories of Groups based on standardised scores.	Independent-Samples Mann-Whitney U Test	.507	Retain the null hypothesis.
3	The distribution of Disinhibition is the same across categories of Groups based on standardised scores.	Independent-Samples Mann-Whitney U Test	.011	Reject the null hypothesis.
4	The distribution of Boredom susceptibility is the same across categories of Groups based on standardised scores.	Independent-Samples Mann-Whitney U Test	.012	Reject the null hypothesis.
5	The distribution of Total for Sensation Seeking Scale is the same across categories of Groups based on standardised scores.	Independent-Samples Mann-Whitney U Test	.012	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Based on the results of the Mann-Whitney U tests described in table 4.15, the following research hypotheses are accepted:

- There are significant differences between the scores of Disinhibition across Deliberate Risk Taking and Precautionary Behaviour Groups based on standardised scores.
- There are significant differences between the scores of Boredom Susceptibility across Deliberate Risk Taking and Precautionary Behaviour Groups based on standardised scores.
- There are significant differences between the scores of Total Sensation Seeking Scale across Deliberate Risk Taking and Precautionary Behaviour Groups based on standardised scores.

4.7 Correlation matrix of the Risk Taking Inventory and the Sensation Seeking Scale-V

In order to determine how group status impacts on the relationships between the Sensation Seeking Scale-V subscales, a correlation matrix was drawn up. According to Pallant (2010), a correlation coefficient describes the direction and strength of a linear relationship between two variables (Pallant, 2010). Since most of the data had not been normally distributed, the Spearman's Rank Order Correlation was conducted. The results are presented in Table 4.16. The results indicate that there are strong, positive correlations for the Deliberate Risk Taking group with regards to the following Sensation Seeking Scale-V subscales:

- Total Sensation Seeking Scale and Experience Seeking (r = .757, n = 33, p < .0001),
- Total Sensation Seeking Scale and Disinhibition (r = .741, n = 33, p < .0001),
- Total Sensation Seeking Scale Boredom Susceptibility (r = .738, n = 33, p < .0001).

The results also show that there are strong, positive correlations for the Precautionary Behaviour group with regards to the following SSS-V subscales:

- Total Sensation Seeking Scale and Experience Seeking (r = .708, n = 36, p < .0001),
- Total Sensation Seeking Scale and Disinhibition (r = .794, n = 36, p < .0001),
- Total Sensation Seeking Scale and Boredom Susceptibility (r = .725, n = 36, p < .0001).

Table 4.16: Correlation matrix of Risk Taking Inventory and Sensation Seeking Scale-V using the Spearman Rank Order Correlation rho

Risk Taking Group			Thrill and Adventure Seeking	Experience Seeking	Disinhibi-tion	Boredom Suscep-tibility	Total Sensation Seeking
Deliberate Risk Taking	Total Sensation Seeking Scale	Correlation Coefficient	.401*	.757**	.741**	.738**	1.000
		Sig. (2-tailed)	.021	.000	.000	.000	.
		N	33	33	33	33	33
	Thrill and Adventure Seeking	Correlation Coefficient	1.000	.363*	.140	-.017	.401*
		Sig. (2-tailed)	.	.038	.437	.927	.021
		N	33	33	33	33	33
	Experience Seeking	Correlation Coefficient	.363*	1.000	.449**	.412*	.757**
		Sig. (2-tailed)	.038	.	.009	.017	.000
		N	33	33	33	33	33
	Disinhibition	Correlation Coefficient	.140	.449**	1.000	.352*	.741**
		Sig. (2-tailed)	.437	.009	.	.045	.000
		N	33	33	33	33	33
	Boredom Susceptibility	Correlation Coefficient	-.017	.412*	.352*	1.000	.738**
		Sig. (2-tailed)	.927	.017	.045	.	.000
		N	33	33	33	33	33
Precautionary Behaviour	Total Sensation Seeking Scale	Correlation Coefficient	.379*	.708**	.794**	.725**	1.000
		Sig. (2-tailed)	.023	.000	.000	.000	.
		N	36	36	36	36	36

	Thrill and Adventure Seeking	**Correlation Coefficient**	1.000	.134	.219	.142	.379*
		Sig. (2-tailed)	.	.436	.199	.410	.023
		N	36	36	36	36	36
	Experience Seeking	**Correlation Coefficient**	.134	1.000	.423*	.427**	.708**
		Sig. (2-tailed)	.436	.	.010	.009	.000
		N	36	36	36	36	36
	Disinhibition	**Correlation Coefficient**	.219	.423*	1.000	.385*	.794**
		Sig. (2-tailed)	.199	.010	.	.020	.000
		N	36	36	36	36	36
	Boredom Susceptibility	**Correlation Coefficient**	.142	.427**	.385*	1.000	.725**
		Sig. (2-tailed)	.410	.009	.020	.	.000
		N	36	36	36	36	36

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Both the Deliberate Risk Taking and Precautionary Behaviour groups had strong, positive correlations between Total Sensation Seeking Scale, Experience Seeking, Disinhibition and Boredom Susceptibility. The Deliberate Risk Taking groups' correlation between Total Sensation Seeking and Experience Seeking, and Total Sensation Seeking and Boredom Susceptibility was stronger than the Precautionary Behaviour group. The Precautionary Behaviour group's correlation between Total Sensation Seeking and Disinhibition was stronger than the Deliberate Risk Taking group.

4.8 Conclusion

This chapter outlined the output of the statistical analyses that were conducted on the data collected during the course of this research study. Firstly, the standardisation of the Risk Taking Inventory and descriptive statistics were discussed. This was followed by the descriptive statistics for the Sensation Seeking Scale-V. Subsequently, Friedman's two way analysis of variance was conducted on the four subscales of the Sensation Seeking Scale-V. Significant differences were found between the Boredom Susceptibility and Thrill and Adventure Seeking subscales, the Boredom Susceptibility and Experience Seeking subscales, the Disinhibition and Experience Seeking subscales, and lastly the Disinhibition and Thrill and Adventure Seeking subscales. Then the descriptive statistics for the Risk Taking Inventory and Sensation Seeking Scale-V were described. This was followed by the independent samples Mann-Whitney U test. Lastly, a correlation matrix between the Risk Taking Inventory and the Sensation Seeking Scale-V showed there were strong positive relationships between Deliberate Risk Taking and Total Sensation Seeking Scale, Experience Seeking, Disinhibition and Boredom Susceptibility as well as Precautionary Behaviour and Total Sensation Seeking Scale, Experience Seeking, Disinhibition and Boredom Susceptibility. The following chapter will provide a discussion of these results.

CHAPTER 5: DISCUSSION OF FINDINGS, LIMITATIONS OF THE STUDY, RECOMMENDATIONS FOR FUTURE RESEARCH AND CONCLUSION

5.1 Introduction

The results of Chapter 4 are discussed and interpreted in Chapter 5. The discussion follows the format of the previous chapter. After the discussion of the results, the limitations of the study are outlined followed by recommendations for future research. The chapter will then be concluded and significant findings outlined.

5.2 Discussion of Results

5.2.1 Classifying participants according to the Risk Taking Inventory

The Risk Taking Inventory was developed as a result of a lack of suitable risk-taking assessment measures. Woodman et al. (2013) noted that the lack of research in the area of risk taking behaviour was due to one-dimensional and unvalidated measures of risk-taking behaviour. The lack of suitable measures meant that participants would be grouped under the risk taking umbrella term, but differences and similarities between risk-takers could not be identified (Fave et al., 2003; Woodman & Bandura, 2010). A rock climber might be climbing a steep rock face without safety equipment, and be described as a Deliberate Risk Taker, and during this climb he/she may adopt many precautionary measures in order to safely ascend the rock face such as checking the rock and weather conditions to avoid potentially negative outcomes (Woodman et al., 2013). The importance of identifying the differences between risk takers, and risk taking within the boundaries of a sport are therefore critical (Kupciw & MacGregor, 2012).

After standardising the Risk Taking Inventory's scores, 47% of the participants were classified as Deliberate Risk Takers and 53% as Precautionary Risk Takers. Woodman et al. (2013) noted that the Risk Taking Inventory would allow researchers to establish the extent to which participants of high-risk sports could be described as having the same attitudes and approaches to risk in their respective sports. The results of this study showed that although all of the participants were rock climbers, two distinct risk taking groups emerged, with slightly more rock climbers taking on a precautionary stance than a Deliberate Risk Taking approach.

Previous studies have focused on accidents/injuries to classify athletes as risk takers. Woodman et al. (2013) noted that this is not an accurate approach since people may deliberately engage in dangerous activities and experience life-threatening close calls, but avoid injury and accidents. Other people may in contrast implement safety precautions to minimise danger and obtain injuries due to uncontrollable circumstances. Woodman et al. (2013) therefore noted that the prevalence and severity of injuries should be incorporated when studying risk taking behaviour to provide a more holistic answer. The current study found that only 11.4% of the rock climbers obtained significant trauma that required hospitalisation. Furthermore, 17.2% of the participants obtained chronic injuries such as stress fractures or tendonitis as a result of rock climbing. Kupciw and McGregor (2012) stated that Deliberate Risk Takers typically experience more near misses and accidents as opposed to the Precautionary Behaviour group who implement safety checks and other measures before engaging in the high risk activity. It is important to understand the motives involved in Deliberate Risk Taking and Precautionary Behaviour due to the potentially life threatening consequences of engaging in high risk sports. Sensation seeking tends to drive inexperienced climbers to take deliberate risk as opposed to experienced climbers (Llewellyn & Sanchez, 2013). Woodman et al. (2013) mentioned that sensation seeking traits can provide insight into this motivation. Further nuances between these groups emerged and are subsequently discussed.

5.2.2. Classifying participants according to the Sensation Seeking Scale

Risk taking and sensation seeking are two terms that are often used interchangeably and many studies have found strong correlations between these terms (Hovarth & Zuckerman, 1993; Paquette et al., 2009; Paquette et al., 2016; Zuckerman, 1994; Zuckerman & Kuhlman, 2000;). Sensation seeking as a personality trait encompasses the need for varied, novel, and complex experiences and sensations, and the willingness to take a variety of risks to obtain these experiences. Risk taking on the other hand refers to personal premeditated choice, uncertainty, unpredictability, chance and potentially negative outcomes (Cazenave et al., 2007). High risk sports participants inherently take physical risks in order to experience novelty and new sensations despite the unpredictability and potential material or bodily damage (Lyng, 2005; Woodman et al., 2013; Zuckerman, 1979).

In the current study, rock climbers' Total Sensation Seeking Scale scores varied from 7 - 35 out of 40. The mean score was *M* = 22.14 (see Table 4.3), and in line with the Total Sensation Seeking score found in a study by Kopp, Wolf, Ruedl and Burtscher (2016). Kopp et al. (2016) measured the differences in sensation seeking between high risk sports participants such as alpine skiers, snowboarders and ski tourers and obtained a mean score of *M* = 21.1 for the alpine skiers. Jack and Ronan (1998) also reported a mean Total Sensation Seeking Scale score of *M* = 23.0 among high-risk sports athletes such as sky-divers, racing car drivers, mountaineers and hang-gliders. The current research therefore confirms that high risk sports athletes tend to score high on the Total Sensation Seeking scale.

Additionally, the rock climbers' mean scores were very high for the Thrill and Adventure Seeking subscale (*M* = 7.46). Thrill and Adventure Seeking has consistently been linked to participation in risky sports (Taylor et al., 2006; Zuckerman, 1983; Zuckerman, 2007). The Thrill and Adventure Seeking subscale is considered to be an indicator of the desire to participate in risky sports and adventurous activities that will lead to novel experiences (Zuckerman, 1994). These results support the findings of Jack and Ronan (1998) who also found that high risk sports participants scored higher on the Thrill and Adventure Seeking subscale than the other subscales (*M* = 7.41). Zuckerman (1983) mentioned that a correlation between the Thrill and Adventure Seeking subscale and participation in a risky sport can indicate a desire to engage in other risky sports. Although nearly all of the participants (98%) engaged in sport climbing, 30% boulder, 20% engage in traditional climbing and 4% solo climb. Moreover, 11% of the participants mentioned that they participate in mountain biking, also considered a high risk sport. This evidently indicates that the rock climbers are inclined to engage in a variety of risky sports to experience these novel sensations.

Experience Seeking as a typical characteristic of high risk sport is related to experiences of the mind and senses (Zuckerman, 2007). Rock climbers in the current study presented a high mean score on the Experience Seeking subscale (*M* = 6.38). In a study of mountain climbers, Cronin (1991) similarly obtained a high mean score of *M* = 6.7. Klinar, Burnij and Kajtna (2017) correspondingly reported mean scores of *M* = 6.32 for high risk sports such as sky diving, alpinism, diving, downhill skiing and ski jumping. Ewert et al. (2013) noted that rock climbers often engage in risky sport because they like challenging and exciting activities. Max (2016) noted that when people engage in risky sports, they experience a sense of self-control since they exert a great amount of mental effort and intense physical effort. It is understandable that the participants in this study scored high on

the Experience Seeking subscale, as rock climbing demands intense physical and mental exertion, often linked to self-control.

This study further revealed low mean scores on the Disinhibition subscale *M* = 4.42. Disinhibition refers to the need for social stimulation through parties, social drinking, gambling and sex as well as meeting new people, being unconventional or non-conformist (Goma-i-Freixanet, 2004). Mean scores of *M* = 5.60 were obtained on the Disinhibition subscale when Jack and Ronin (1998) studied a group of high risk sports athletes. Wagner and Houlihan (1994) also found low Disinhibition mean scores for hang gliding pilots. One can therefore argue that a large proportion of high-risk sports athletes including rock climbers, do not primarily seek out novelty through parties and sex or unconventional lifestyles, but rather through the physical risks found in their respective sports and through their minds and senses.

Boredom susceptibility refers to actively avoiding repetition, routine or boring social interactions (Zuckerman, 1994). Items relating to Boredom Susceptibility include “I can’t stand watching a movie that I’ve seen before” and “The worst social sin is to be a bore”. This study confirmed that high risk sports participants often obtain low mean Boredom Susceptibility scores (*M* = 3.88). When assessing a group of hang gliders, mountaineers, sky divers and automobile racers, Jack and Ronin (1998) found low mean scores on the Boredom Susceptibility subscale (*M* = 4.14). Frauman and Clevenger (2010) similarly found low mean scores amongst boulderers (*M* = 3.43). The average rock climber in the current study has been climbing for *M* = 6. 2 years and 77% of the rock climbers noted that they climb at least once a week or more. In order to master a difficult rock face, rock climbers often have to ascend the climb more than once and practice a series of moves. This evidence suggests that rock climbers do not readily experience the need to avoid repetitive tasks or avoid boring social interactions. They rather seek out physical activities and engage in the task in a routine fashion to master their sport.

The results of this study are in line with many studies on high risk sports athletes that have also found high mean scores on the Total Sensation Seeking Scale, Thrill and Adventure Seeking and Experience Seeking subscales (Breivik, 1991; Dieham & Armatas, 2004; Freixanet, 1991; Slanger & Rudestam, 1997). Freixanet (1991) found that high risk sports participants (mountain climbers, mountaineers, water skiers, motorcyclists and scuba divers) scored significantly higher on the Total Sensation Seeking Scale, Thrill and Adventure Seeking, and Experience Seeking subscales than a control group of low sensation seekers.

The rewards of high risk activities such as rock climbing seem to outweigh the risks for high sensation seekers such as rock climbers. Hovarth and Zuckerman (1993) postulated that many sensation seekers don't see themselves as being at risk because they are experienced in their respective sports and experience mediates the perception of risk. They also noted that a lack of experience does not increase the perception of risk, as many high sensation seekers who have never engaged in an activity see these activities as less risky than low sensation seekers (Zuckerman, 1979). When Zuckerman (1979) asked sensation seekers to rate the risk associated with various activities and indicate how often they engaged in them, it was clear that the more experienced a person was in an activity, the less risky it was judged to be. The current study found that the average rock climber has been climbing for *M* = 6.2 years and the self-reported rock climbing ability grade of males (20) was higher than females (18). In addition, younger participants (18-19 years of age), gave the highest average self-reported rock climbing ability grade. The low percentage of self-reported acute and chronic injuries also reflects the fact that the more experienced rock climbers become, the more they understand the risks involved and the possibility of injury which reflects on their risk taking profile. Franken (1998) found that a motivation to engage in riskier forms of practice increases with experience and ability level, which allows athletes to challenge themselves and maintain optimum levels of arousal.

5.2.3 Differences between the four Sensation Seeking Scale-V constructs

Significant differences were found between rock climbers' scores for the Boredom Susceptibility (*Md* = 4.00) and Thrill and Adventure Seeking (*Md* = 8.00; $p < 0.001$) subscales. In addition there were significant differences between the scores of Boredom Susceptibility (*Md* = 4.00) and Experience Seeking (*Md* = 6.00, $p < 0.001$). The scores of Disinhibition (*Md* = 4.00) and Experience Seeking (*Md* = 6.00; $p < 0.001$) also differed significantly. Lastly, the Disinhibition (*Md* = 4.00) and Thrill and Adventure Seeking (*Md* = 6.00; $p < 0.001$) scores differed significantly. These findings confirmed the results obtained when comparing the means of the different subscales (see 5.2.2.) This indicates that rock climbers are more likely to seek out adventure and physically exciting activities, enjoy stimulation through the mind and senses, and live an unconventional lifestyle; and less likely to experience aversion to unstimulating people and environments or the need to engage in uninhibited behaviour. As such the research hypothesis stating that there are differences between the scores of the Sensation Seeking Scale-V subscales is partially accepted. Previous studies have also found that high risk sports participants had significantly higher scores on the Thrill and Adventure Seeking and Experience Seeking

subscales (Campbell et al., 1993). Campbell et al. (1993) noted that all of the items on the Thrill and Adventure Seeking subscale referred to an appeal to participate in high risk sports activities. They argued that when one studies a sport measured in the Thrill and Adventure Seeking subscale a problem of tautology can arise. Zuckerman (1983) mentioned two ways to overcome the issue of tautology. Firstly, one could exclude the subscale from the Total Sensation Seeking Scale, although the scale has been found to be theoretically sound and has relevance to research findings, or one could focus on measuring a high risk sport not covered in the subscale (Campbell et al., 1993). Since rock climbing is not measured in the Thrill and Adventure Seeking subscale, these assumptions are valid to the current research.

In light of the above discussion, the research hypothesis stating that there will be significant differences between the Sensation Seeking subscales is partially accepted.

5.2.4 Differences between the Deliberate Risk Taking and Precautionary Behaviour groups

There is currently no known research in the literature that investigates the differences between Deliberate Risk Taking and Precautionary Behaviour groups, or their associations with the Sensation Seeking Scale-V.

The results of this study showed that the Deliberate Risk Taking group (M = 23.97) had a slightly higher mean score on the Total Sensation Seeking Scale than the Precautionary Behaviour group (M = 20.47). The Deliberate Risk Taking Group and the Precautionary Behaviour groups further differed significantly on the Total Sensation Seeking Scale. It can therefore be argued that Deliberate Risk Takers are more likely to seek out novel and intense sensations and experiences than the Precautionary Behaviour group. Further research should be conducted to confirm this finding.

Both groups nevertheless scored relatively similar on the Thrill and Adventure Seeking subscale (see table 4.9). There were no statistically significant differences between the Deliberate Risk Taking (Md = 8.00, n = 33) and Precautionary Behaviour groups (Md = 7.00, n = 36), U = 500.00, z = -1.158, p = 0.247) (see table 4.11). The results therefore indicate that rock climbers share the need to engage in physically dangerous/risky sports, despite taking on a precautionary or deliberate approach to risks.

The Deliberate Risk Taking and Precautionary Behaviour groups correspondingly obtained relatively similar scores on the Experience Seeking subscale, with the Deliberate Risk Taking group scoring slightly higher on this subscale (*M* = 6.58) than the Precautionary Behaviour group (*M* = 6.19). There were also no meaningful differences between the Deliberate Risk Taking (*Md* = 6.00, *n* = 33) and Precautionary Behaviour groups (*Md* = 5.00, *n* = 36) on this subscale, *U* = 539.50, *z* = - 0.663, *p* = 0.507 (see table 4.12). The participants in this study therefore seek out experiences of the mind and senses that rock climbing provides. The need for mental effort and intense physical strain pervades any sub-classification of risk taking and alludes to the amount of self-control exerted by these athletes to master the sport (Max, 2016).

The mean Disinhibition subscale score was higher amongst the Deliberate Risk Taking group (*M* = 5.24) than the Precautionary Behaviour group (*M* = 3.67), although it was still low (see table 4.9). There were statistically significant differences between the Deliberate Risk Taking (*Md* = 6.00, *n* = 33) and Precautionary Behaviour groups (*Md* = 3.00, *n*= 36), *U* = 383.50, *z* = - 2.55, *p* = 0.011. Disinhibition refers to a need for social stimulation, and is often found in high, medium and low risk sports due to the social nature of the sport (Goma-i-Freixanet, 2004). Deliberate Risk Takers may therefore be more inclined to seek out novel experiences found in uninhibited and social behaviour than precautionary rock climbers.

Statistically significant differences were furthermore obtained between the Deliberate Risk Taking (*Md* = 5.00, *n* = 33) and Precautionary Behaviour groups (*Md* = 3.00, *n* = 36) on the Boredom Susceptibility subscale, *U* = 388.00, *z* = - 2.50, *p* = 0.012. Boredom Susceptibility refers to restlessness and boredom when repetition cannot be averted (Zuckerman, 1983). Deliberate Risk Takers are therefore more likely to experience restlessness and avoid boredom than Precautionary Risk Takers.

Based on these findings the research hypothesis stating that Deliberate Risk Taking and Precautionary Behaviour groups differ with regards to the scores on the Sensation Seeking Scale-V constructs is partially accepted.

5.2.5 Differences between the Deliberate Risk Taking and Precautionary Behaviour groups and their associations with the Sensation Seeking Scale-V

Zuckerman (2007) noted that research on high risk sport has been reliant on the sensation seeking model. This reliance is often attributed to the view that high risk sports participants are a homogenous group of individuals within and across disciplines (Woodman et al., 2013). The Risk Taking Inventory has shown that this position is invalid and that differences between rock climbers do indeed exist.

This study revealed that the Deliberate Risk Taking group had strong positive correlations between the Total Sensation Seeking Scale and the Experience Seeking subscale; $r = .757$, $n = 33$, $p < .0001$; meaning that high levels of Total Sensation Seeking are associated with high levels of Experience Seeking. Deliberate Risk Takers are therefore more likely to seek out stimulation and new experiences through the mind and senses and live unconventional lifestyles (Goma-i-Freixanet, 2004). Max (2016) similarly stated that high risk sports participants, such as rock climbers, often engage in sporting activities that require intense physical and mental effort.

High Total Sensation Seeking Scale scores were further associated with high Disinhibition subscale scores, $r = .741$, $n = 33$, $p < .0001$. Deliberate Risk Takers are therefore more likely to seek out stimulation through social situations such as parties, social drinking etc. Since the data was collected from individuals who met in group settings when climbing, and the nature of the sport itself typically requiring a belaying partner, it can be argued that the Deliberate Risk Takers enjoy the social nature of rock climbing.

The Deliberate Risk Taking group further showed strong positive correlations between the Total Sensation Seeking Scale and the Boredom Susceptibility subscale, $r = .738$, $n = 33$, $p < .0001$. It is therefore reasonable to state that Deliberate Risk Takers seek out novel experiences in order to avoid repetitive and unstimulating situations through rock climbing.

The Precautionary Behaviour group on the other hand also showed strong positive correlations between the Total Sensation Seeking Scale and Experience Seeking subscale, $r = .708$, $n = 36$, $p < .0001$. High Total Sensation Seeking Scale scores are therefore associated with high Experience Seeking subscale scores. The Precautionary Behaviour group subsequently seeks out new and intense experiences through the mind and senses. Indoor and outdoor climbing provides them with these experiences.

In addition, high scores on the Total Sensation Seeking Scale were associated with high scores on the Disinhibition subscale, $r = .794$, $n = 36$, $p < .0001$. Many rock climbers taking on a precautionary stance; therefore enjoy the social setting of the sport and the unconventional lifestyle once associated with the 1950'5 and 1960's *Hippy* era.

Lastly, the Precautionary Behaviour group showed strong positive correlations between the Total Sensation Seeking Scale and the Boredom Susceptibility subscale, $r = .725$, $n = 36$, $p < .0001$. As such high Total Sensation Seeking scores lead to high Boredom Susceptibility subscale scores, and precautionary rock climbers tend to circumvent boredom.

The research hypothesis stating that group status impacts on the relationship between the subscales of the Sensation Seeking Scale-V is partially accepted. Research on risk taking attitudes and behaviour in the high risk sport domain is limited (Castenier et al., 2010a; Myrseth et al., 2012). Currently little is known about the associations between Deliberate Risk Taking, Precautionary Behaviour and the subscales of the Sensation Seeking Scale-V. Further studies should be conducted to broaden knowledge on the topic.

5.3 Limitations of the study

All studies are faced with unplanned outcomes and confounding variables, and presents with its own set of limitations that can be considered in future research. The current research study presented with the following limitations:

Firstly, the study made use of a non-probability purposive sampling method. The benefit of this method was that rock climbers associated with the Mountain Club of South Africa could be targeted and included in the study. The results of the study are however not generalisable to the broader rock climbing population of South Africa (Babbie, 2016).

Secondly, only rock climbers in the Gauteng vicinity were included in the study. Although inferences can be made, the results cannot be generalised to rock climbers in other provincial areas of South Africa, and the results should be interpreted with caution.

Thirdly, the Risk Taking Inventory revealed inter-item correlations that were less reliable. This was due to the unequal number of statements for the Deliberate Risk Taking and Precautionary Behaviour groups. As such the results were transformed into z-scores, to make them more comparable. This meant that the Risk Taking Inventory could not be used without adjustment.

The researcher aimed to obtain a sample size of 100, although a final sample of 69 was obtained. The smaller sample size and non-normally distributed data meant that non-parametric tests had to be conducted. Although these methods are statistically robust, a larger sample size might have resulted in normally distributed data.

5.4 Recommendations for future research

Future research should address the limitations of the current study. Researchers should include participants from the other provincial areas of South Africa as regional differences may be observed.

Since research on the Risk Taking Inventory is limited, there is an opportunity to conduct further studies on risk taking. Additional studies on this topic will aid the current understanding of risk taking in extreme sports. It is therefore recommended that future studies should focus on more than one extreme sport and aim to identify significant differences between these sports.

The current study focused on risk taking in rock climbers, mainly sport climbers. Future studies should include rock climbers from other disciplines and assess whether they differ significantly on the Risk Taking Inventory and their associations with sensation seeking. Awareness into the risk taking behaviour of the various sub-disciplines of rock climbing can provide institutions such as the Mountain Club of South Africa with insight into the types of risks that rock climbers take, and ways to mitigate risk through training and group climbing initiatives. Pain and Pain (2005) stated that the types of risk people take depend on the activity and the circumstances surrounding the activity. In addition, both types of risk can be taken by one person. It is therefore important to understand risk taking differences between and within individuals. This also links up to the last recommendation.

Lastly, future studies should consider including an informant measure of risk taking as an informant may provide insight into risk taking behaviour that rock climbers are not aware of (Woodman et al., 2013). Self-reported risk taking behaviour may only reflect a portion of the actual risk taking behaviour that high risk sports athletes portray. An informant measure may add depth to the findings and illustrate that more than one type of risk taking behaviour exist in one individual and that it is situation dependent.

5.5 Conclusion

The discussion and interpretation of the research findings were presented in Chapter 5. The study clearly showed that rock climbers can be grouped into Deliberate Risk Taking and Precautionary Behaviour groups. As such the risk taking attitudes and behaviours of individual rock climbers differ and one cannot assume homogeneity amongst rock climbers. Significant differences were found between the scores of the Sensation Seeking Scale-V subscales. Rock climbers are more likely to score high on the Total Sensation Seeking Scale, the Thrill and Adventure Seeking and Experience Seeking subscales. These findings were in line with the findings on high risk sports athletes in the literature. The Deliberate Risk Taking group differed significantly from the Precautionary Behaviour group on the Total Sensation Seeking, Disinhibition and Boredom Susceptibility subscales. As such the Deliberate Risk Taking group is more likely to also seek out novelty through uninhibited behaviour such as parties, social drinking, gambling, and sex, and avoid repetition and boring social interactions than the Precautionary Behaviour group. High Total Sensation Seeking scale scores were positively correlated with high scores on the Experience Seeking, Disinhibition and Boredom Susceptibility subscales in both groups.

The current study has provided a basis for future studies to be conducted and a deeper understanding of risk taking behaviour to emerge. The scarcity of research on the Risk Taking Inventory and risk taking behaviour in the South African high risk sport environment invites future studies to add to the body of literature.

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APPENDIX A: DEMOGRAPHIC QUESTIONNAIRE

Date: Respondent number:

Biographic Information

1. What is your age?									
2. What is your sex?	Female			Male			Refuse to answer		
3. To which race group do you belong?	Black	White	Coloured	Indian	Asian	Other	Refuse to answer		
4. In which province do you reside?	Eastern Cape	Free State	Gauteng	Kwa-Zulu Natal	Limpopo	Mpuma-langa	North-West	Northern Cape	Western Cape
5. Please list you top three sports/activities	1.								
	2.								
	3.								
6. How often do you rock climb?	Once a week	Once a month	Once in three months	Once in six months	Once a year				
7. How would you rate your rock climbing ability level? Use the rock climbing standard grade levels.									
8. How long have you been participating in rock climbing?									
9. What type of rock climbing do you do?									

10. Please state the total number of injuries that you have obtained whilst participating in rock climbing.	
11. Please state the number of acute injuries whilst participating in rock climbing (significant trauma, required hospitalization)	
12. Please state the number of chronic injuries whilst participating in rock climbing (stress fracture, tendonitis, etc.)	
13. Please state the number of common injuries whilst participating in rock climbing (sprains, fractures, cuts, bruising).	

APPENDIX B: RISK TAKING INVENTORY

Date:
Respondent number:

Risk Taking Inventory (RTI)

Please complete the questions below by making use of a 5 point scale where 1 is never, 2 is rarely, 3 is sometimes, 4 is often and 5 is always. Please note that you responses will remain anonymous and the results will not be analysed individually.

Please rate the following questions based in relation to your participation in rock climbing. Mark the appropriate option with an **X**.

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
I deliberately put myself in danger.					
I take time to check conditions (e.g. weather).					
It's like gambling, you can't win unless you try it.					
I check any gear/ equipment that I borrow.					
I actively seek out dangerous situations.					
I am aware of the nearest help and first aid.					
I take time to check for potential hazards.					

APPENDIX C: RTI PERMISSION LETTER

Jean-Paul Tim Woodman <t.woodman@bangor.ac.uk> 6/26/14

to me

Dear Mariette,

Please do use the RTI. It is now published in the Journal of Sport and Exercise Psychology. I could send you a copy on my return from leave if you can't access it. Alternatively please contact Matt Barlow (m.barlow@bangor.ac.uk).

Best of luck with your research!

Tim

--

Professor Tim Woodman CPsychol
Head, School of Sport Health & Exercise Sciences
Bangor University
www.bangor.ac.uk/sport/

Rhif Elusen Gofrestredig 1141565 - Registered Charity No. 1141565

Gall y neges e-bost hon, ac unrhyw atodiadau a anfonwyd gyda hi, gynnwys deunydd cyfrinachol ac wedi eu bwriadu i'w defnyddio'n unig gan y sawl y cawsant eu cyfeirio ato (atynt). Os ydych wedi derbyn y neges e-bost hon trwy gamgymeriad, rhowch wybod i'r anfonwr ar unwaith a dilewch y neges. Os na fwriadwyd anfon y neges atoch chi, rhaid i chi beidio a defnyddio, cadw neu ddatgelu unrhyw wybodaeth a gynhwysir ynddi. Mae unrhyw farn neu safbwynt yn eiddo i'r sawl a'i hanfonodd yn unig ac nid yw o anghenraid yn cynrychioli barn Prifysgol Bangor. Nid yw Prifysgol Bangor yn gwarantu bod y neges e-bost hon neu unrhyw atodiadau yn rhydd rhag firysau neu 100% yn ddiogel. Oni bai fod hyn wedi ei ddatgan yn uniongyrchol yn nhestun yr e-bost, nid bwriad y neges e-bost hon yw ffurfio contract rhwymol - mae rhestr o lofnodwyr awdurdodedig ar gael o Swyddfa Cyllid Prifysgol Bangor.

This email and any attachments may contain confidential material and is solely for the use of the intended recipient(s). If you have received this email in error, please notify the sender immediately and delete this email. If you are not the intended recipient(s), you must not use, retain or disclose any information contained in this email. Any views or opinions are solely those of the sender and do not necessarily represent those of Bangor University. Bangor University does not guarantee that this email or any attachments are free from viruses or 100% secure. Unless expressly stated in the body of the text of the email, this email is not intended to form a binding contract - a list of authorised signatories is available from the Bangor University Finance Office.

APPENDIX D: SENSATION SEEKING SCALE-V

Date:
Respondent number:

Sensation Seeking Scale V (SSS-V)

Please complete the questions below by making use of one of the two options, A or B per question. Please select the option that best describes your likes or the way you feel. In some instances both options might describe your likes or how you feel. Only select the option that better describes your likes or feelings. In some instances the options might not describe your likes or feelings, in these instances mark the options that you dislike the least.

Do not leave any questions blank, and only select one option per question, A or B. Please note that we only want to know more about how you feel and what you like, and there are no correct or incorrect options. If you have not encountered/ experienced a situation that one of the questions refer to, you can respond to the question by imagining that you will encounter the situation in the future.

Please note that you responses will remain anonymous and the results will not be analyzed individually. We are not interested in how others feel about these things or how one is supposed to feel. The questionnaire consists of 40 questions and will take approximately 10 minutes to complete. Please feel free to give your honest opinion and mark the correct response with an X.

Number	Select Option with X	Question
1.		A. I like “wild” uninhibited parties.
		B. I prefer quiet parties with good conversation.
2.		A. There are some movies I enjoy seeing a second or even a third time.
		B. I can’t stand watching a movie that I’ve seen before.
3.		A. I often wish I could be a mountain climber.
		B. I can’t understand people who risk their necks climbing mountains.
4.		A. I dislike all body odours.
		B. I like some of the earthy body smells.
5.		A. I get bored seeing the same old faces.
		B. I like the comfortable familiarity of everyday friends.

6.		A. I like to explore a strange city or section of town by myself, even if it means getting lost.
		B. I prefer a guide when I am in a place I don't know well.
7.		A. I dislike people who do or say things just to shock or upset others.
		B. When you can predict almost anything a person will do or say he or she must be a bore.
8.		A. I usually don't enjoy a movie or play where I can predict what will happen in advance.
		B. I don't mind watching a movie or play where I can predict what will happen in advance.
9.		A. I have tried marijuana or would like to.
		B. I would never smoke marijuana.
10.		A. I would not like to try any drug which might produce strange and dangerous effects on me.
		B. I would like to try some of the drugs that produce hallucinations.
11.		A. A sensible person avoids activities that are dangerous.
		B. I sometimes like to do things that are a little frightening.
12.		A. I dislike "swingers" (people who are uninhibited and free about sex).
		B. I enjoy the company of real "swingers".
13.		A. I find that stimulants make me uncomfortable.
		B. I often like to get high (drinking liquor or smoking marijuana).
14.		A. I like to try new foods that I have never tasted before.
		B. I order the dishes with which I am familiar so as to avoid disappointment and unpleasantness.
15.		A. I enjoy looking at home movies, videos, or travel slides.
		B. Looking at someone' home movies, videos, or travel slides bores me tremendously.
16.		A. I would like to take up the sport of water skiing.
		B. I would not like to take up water skiing.
17.		A. I would like to try surfboard riding.
		B. I would not like to try surfboard riding.
18.		A. I would like to take off on a trip with no preplanned or definite routes, or timetable.
		B. When I go on a trip I like to plan my route and timetable fairly carefully.

19.		A. I prefer to “down to earth” kinds of people as friends.
		B. I would like to make friends in some of the “far-out” groups like artists or “punks”.
20.		A. I would not like to learn to fly and airplane.
		B. I would like to learn to fly an airplane.
21.		A. I prefer the surface of water to the depths.
		B. I would like to go scuba diving.
22.		A. I would like to meet some persons who are homosexual (men or women).
		B. I stay away from anyone I suspect being “gay” or “lesbian”.
23.		A. I would like to try parachute jumping.
		B. I would never want to try jumping out of a plane, with or without a parachute.
24.		A. I prefer friends who are excitingly unpredictable.
		B. I prefer friends who are reliable and predictable.
25.		A. I am not interested in experience for its own sake.
		B. I like to have new and exciting experiences and sensations even if they are a little frightening, unconventional, or illegal.
26.		A. The essence of good art is in its clarity, symmetry of form, and harmony of colours.
		B. I often find beauty in the “clashing” colours and irregular forms of modern paintings.
27.		A. I enjoy spending time in the familiar surroundings of home.
		B. I get very restless if I have to stay around home for any length of time.
28.		A. I like to dive off the high board.
		B. I don’t like the feeling I get standing on the high board (or I don’t go near it at all).
29.		A. I like to date persons who are physically exciting.
		B. I like to date persons who share my values.
30.		A. Heavy drinking usually ruins a party because some people get loud and boisterous.
		B. Keeping the drinks full is the key to a good party.
31.		A. The worst social sin is to be rude.
		B. The worst social sin is to be a bore.
32.		A. A person should have considerable sexual experience before marriage.

		B. It's better if two married persons begin their sexual experience with each other.
33.		A. Even if I had the money, I would not care to associate with flighty rich persons in the "jet set".
		B. I would conceive of myself seeking pleasures around the world with the "jet set".
34.		A. I like people who are sharp and witty even if they do sometimes insult others.
		B. I dislike people who have their fun at the expense of hurting the feelings of others.
35.		A. There is altogether too much portrayal of sex in movies.
		B. I enjoy watching many of the "sexy" scenes in movies.
36.		A. I feel best after taking a couple of drinks.
		B. Something is wrong with people who need liquor to feel good.
37.		A. People should dress according to some standard of taste, neatness and style.
		B. people should dress in individual ways even if the effects are sometimes strange.
38.		A. Sailing long distances in small sailing crafts is foolhardy.
		B. I would like to sail a long distance in a small but seaworthy sailing craft.
39.		A. I have no patience with dull or boring persons.
		B. I find something interesting in almost every person I talk to.
40.		A. Skiing down a high mountain slope is a good day to end up on crutches.
		B. I think I would enjoy the sensation of skiing very fast down a high mountain slope.

APPENDIX E: MCSA PERMISSION LETTER

The Mountain Club of South Africa
Founded 1891
Johannesburg Section
Established 1931

EXPLORE • DISCOVER • CONNECT • PROTECT

Address: P O Box 1641, Houghton, 2041 **Tel / Fax** : +27 11 807-1310
Email : admin@jhb.mcsa.org.za **Website:** www.mcsajohannesburg.org

8 July 2015

RE: Rock climbers: The differences between deliberate and precautionary risk takers based on their associations with sensation seeking.

Dear Mariëtte,

The MCSA (JHB division) hereby approves your request to conduct your MA Research Psychology study with the MCSA club members. The members will voluntarily participate in the study and contact you if they are interested in participating in your study.

Kind regards,
Roland Magg

Signature

APPENDIX F: CONSENT FORM

INFORMED CONSENT FORM

Consent to participate in research study

	Researcher	Supervisor
	Mariëtte Croukamp	Dr Nicoleen Coetzee
T:	082 853 8919	+27 012 420 2919
E:	croukampmariette@gmail.com	nicoleen.coetzee@up.ac.za

1. Aim of the study

Rock climbers: The differences between deliberate and precautionary risk takers based on their associations with sensation seeking.

2. Procedures

- Each participant will be asked to sit at a table and chair.
- A paper based demographic questionnaire will be handed to the participant for completion.
- The participant will then be asked to complete two paper based questionnaires of which the one will take 5 minutes to complete and the other 10 minutes.
- The total time needed to complete the study is 15 to 20 minutes.
- Upon completion of the questionnaires, the participants are free to continue with their rock climbing activities.

3. Risks and discomforts

No risks or discomfort from participation in this study is foreseen. The researcher will provide a table and chair for the participant to sit at while completing the paper based questionnaires.

4. Purpose of the data

The results of the study will be used for research purposes. By consenting to participate in this survey, you agree that your results may be used for the current and future research studies.

5. Participants' rights

Should you wish to participate it is important to take note of the following participant rights:

- Participation in this research study is completely voluntary.
- The refusal to participate or withdrawal at any moment during the process will not have any negative consequences on the participant.
- The participant may ask the researcher about any uncertainties that might arise at any point during the study.
- The participant will not experience any form of physical, psychological or legal harm, victimisation, coercion or discrimination.
- The participant will not be cheated, tricked, deceived or insulted during the research.
- The respondent will be treated with the highest levels of professionalism and competence that complies with best practice standards and ethical rules of the Health Professions Council of South Africa and the University of Pretoria.
- The respondent will be treated with respect and his/her dignity and worth shall be upheld at all times to protect his/her human rights.
- The respondent has the right to hold his/her own opinions, beliefs and attitudes and these may differ from the researcher's perspective.

6. Confidentiality

- All data will be treated confidentially in that no names or identifying criteria will be linked to one single respondent.
- Randomized respondent numbers will be generated and given to each respondent. This identifying number will be used on all assessment measures to ensure confidentiality.
- Should the participant choose to withdraw from the study, the data collected for that participant will be destroyed.
- Access to the research data will be mostly limited to:
    - The researcher – Mariëtte Croukamp
    - The supervisor – Dr Nicoleen Coetzee
    - Examinators - Internal and external
    - The statistical department at the University of Pretoria or an external consultant
    - The library at the University of Pretoria
    - The possibility of an academic journal and its readers
    - The participant if he/she wishes to see the results

7. The respondent may contact the researcher about the research study and results after his/her participation in the survey on the contact details provided above.

By signing this consent form, you agree that you have read and understand the nature and process of the research study and your rights as a research participant.

I _____, hereby agree to participate in the research study and have read and understood the research procedures and rights.

Hereby signed at this _____ day of _____201____ at _____.

Cell Phone Number: _____

Email address: _____

Signature of the respondent Signature of the researcher