



University of Thessaly

Department of Physical Education and Sport Sciences

**Extreme Sports Injury:
An applied approach to psychological effects and coping**

by

Nollaig Ni Chárthaigh

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Approved by supervising committee:

Main Supervisor: Charis Kouthouris, Associate Professor

Supervisor 2: Marios Goudas, Professor

Supervisor 3: Yannis Theodorakis, Professor

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Abstract

Extreme sports tend to expose athletes to elevated levels of risk of injury compared to traditional sports. Athletes often struggle with the psychological demands of injury. This study explored how extreme sport injury affect athlete's psychological well-being, determined coping strategies used and presented mental skills to enhance coping. Semi-structured interviews were conducted with ten extreme sports athletes from various sports under specific criteria. An interpretative thematic analysis with inductive reasoning was utilised, producing four themes and eight subthemes. Main injury-related emotions identified included; fear, frustration, anger, worry and feelings of depression. Some athletes found the psychological elements of injury more challenging than the physical and their sporting identity was impacted. Coping strategies aided rehabilitation and recovery. Mental toughness was perceived to be linked with reduced rates of injury occurrence and enhanced wellbeing. Suggested mental skills provided for participants to improve coping includes thought logs, goal-setting, visualisation and progressive muscle relaxation amongst others. Sport injury rehabilitation programmes should address psychological aspects of injury to fast-track the healing process and the return to sport.

Extreme Sports Injury: An applied approach to psychological effects and coping

Extreme sports are '*independent adventure activities where a mishandled mistake or accident would likely cause death*', a classification offered by Brymer, E. (2005) and utilised in Extreme Sports Medicine (Brymer & Houge Mckenzie, 2016, p. 4). This definition is adhered to throughout this research. Terms such as 'action sports', 'lifestyle sports', 'urban sports' and 'free sports' are often used as universal classifications for similar modern and alternative adventure activities (Brymer & Schweitzer, 2013). The phenomenon of extreme sports originated thousands of years ago, its popularity was heightened in the 1950's and 1960's and today they continue to be established and developed (Sagert, 2008, pp. xvii-xxv). Extreme sports have become synonymous with activities such as bungee-jumping, sky-diving, snowboarding, hand-gliding, paragliding, rock-climbing, kayaking, rafting and canyoning (Willig, 2008). While more traditional sports such as golf and basketball have undergone decreasing rates of participations in the last three decades, action and extremes sports have surged despite the risk of injury or death (Pain & Pain, 2005). What divides extreme sports from other sports is that there is no second chance, therefore, extreme sports match the proposed definition as sports that are truly on the outer limits (Brymer G. E., 2005).

According to a summary of injury statistics by the European Union (Eurosafte, 2013) the number of sports injuries is increasing due to higher rates of participation. An estimated 1,000 unintentional fatal sports injuries and an estimated 6.1 million non-fatal sports injuries have occurred from 2008-2010. Regarding extreme sports, it boasted 40 million US participants in 2010 as stated by industry reports (Miller, 2010). A six-year epidemiologic study on 7 extreme sports (snowboarding, snowmobiling, surfing, skateboarding, snow-skiing, water skiing and roller-skating) in the US recorded 9,369 knee dislocations and 742 hip dislocations (Sabesan, Lombardo, Sharma, & Valikodath, 2015). 4 million injuries in extreme sports were also reported between 2000 and 2011 in the US with 11.3% of these being head and neck injuries (HNIs). The sports with the highest rate of HNIs included skateboarding (129,600), snowboarding (97,527), skiing (83,313) and motocross (78,236) (Sharma, Rango, Connaughton, Lombardo, & Sabesan, 2015).

Regarding injury risk, extreme sports often expose athletes to elevated levels of risk than that of more traditional sports (Young, 2002). Injuries in extreme sports may take place due to blunt force trauma or repetitive overuse (Rintala, Elliot, DeClerk, Rairdon, & Bridgham, 2007). For instance, one person in 10 who summits Mount Everest successfully, on average, will die on descend due to accident or exhaustion (Sutherland, 2006). Waterfall kayaking involves kayaking over river formations of 30 metres or more, where an underestimated or miscalculated effort could potentially cause death (Weaver, 2009). Big wave surfers ride waves which can be over 6 metres in height, in cases such as this, even the most distinguished and talented surfers have lost their lives (Warshaw, 2000). Rock climbing involves the risk of developing unusual overuse injuries of the upper extremities, comprising of stress fractures, proximal interphalangeal collateral ligament injuries, and flexor digitorum tendinitis (Young, 2002). Motocross is a high -risk sport with an elevated rate of knee sprain, wrist and clavicular fractures as well as spine lesions with neurologic deficit recorded in indoor races (Gobbi, Tuy, & Panuncialman, 2004). Medical professionals must be mindful of the distinction between extreme sports and more traditional sports in terms of injury epidemiology, management following an injury, treatment and rehabilitation (Laver, Pengas, & Mei-Dan, 2017).

With respect to psychological models of sports injury, the Williams Andersen's stress-injury model pinpoints psychological risk factors into three groups; personality (e.g. trait anxiety and perfectionism) history of stressful events (e.g. major life event stress, daily hassles and previous injury history) and coping (e.g. psychological skill use and social support) (Johnson & Podlog, 2014). These classifications have also been suggested to affect stress responses and the subsequent probability of injury (Andersen & Williams, 1988). The Wiese-Bjornstal, Smith, Shaffer and Morrey (1998) post injury cognitive appraisal model determines that individuals may respond to an injury differently based on perceptions of the meaning of the injury, perceived outcomes and one's ability to cope (Wiese-Bjornstal, Smith, Shaffer & Morrey, 1998). According to this model, personal factors (age, injury history, pain tolerance and confidence in one's ability to deal with rehabilitation demands) influence the evaluation of an injury (Brewer, 2007). Situational factors (relationship with sports medicine practitioner, timing of the injury and availability and use of psychological interventions) also influence this process (Johnson & Podlog, 2014).

Several studies have further demonstrated that in addition to dealing with the physical strains of injury, athletes are compelled to manage psychosocial stressors. An overview of the literature reveals that psychosocial stressors, coping resources, and situation-dependent emotional states can influence an athlete's risk of injury occurrence (Junge, 2000), which can include threats to self-esteem, to one's professional sporting career, can cause seclusion from peers (Johnson & Podlog, 2014) and holistic injury recovery requires both physical and psychological symptoms to be addressed (Brewer, 2001, p. 162). Podlog, Dimmock and Miller (2011) reviewed evidence indicating that athletes who return to sport following injury rehabilitation can exhibit many psychosocial concerns including re-injury anxiety, performance worries, feelings of isolation, an absence of athletic identity, a lack of social support, pressure to return to sport and anxiety about fitness or skill compared to competitors. Klenk (2006) explored emotional responses of athletes to injury and reported issues relating to injury adjustment including activity restriction, lengthy periods of rehabilitation, and the disruptive emotions that arise from being externally controlled. Athletes' emotional responses and recovery was impacted by the perceived magnitude of sport, time devoted to the sport, stress, pressure, gender and severity of injury. Common and highly ranked emotions included frustration, depression, anger and tension as well as disbelief, fear, rage, and fatigue.

Regarding psychological consequences within extreme sport injury, research is limited however Brymer E. (2010) investigated risk and extreme sport and reported that participants of extreme sports admit that injury and death are possible and undertake thorough training including learning about the specific task, the environment and their own ability. This process reduces the likelihood of experiencing harmful outcomes and allows positive effects to prevail. Pain and Kerr (2004) examined a case report of an athlete with a long history of taking part in extreme sport such as sky-diving, rock-climbing and jet-skiing. In the space of two years, the athlete had suffered a compound fracture of his left tibia and fibula while sky-diving, had broken his back, broken and dislocated his right shoulder, broken four ribs which punctured both lungs, incurred serious brain damage while go-karting and also had badly bruised his heel and had broken a rib while skydiving. This trauma had made him partially physically disabled and he experienced anger and frustration due to being unable to perform everyday motor skills. Despite these negative effects, the athlete was determined to get fit and continue in these high-risk sports. Breton (2000) also narrated athlete's experiences of injury in extreme sports. An alpine guide and avid participant of extreme skiing and speed descents of waterfalls had suffered head, shoulder, leg, finger, hand and teeth injuries with his most

serious injury causing paralysis in his left leg and seven fractures. He stated *'accidents have never stopped me, once healed, I always go back to my mountains'*. An off-piste skier commented *'you have to suffer a bit in order to appreciate the good things in life'* (Breton 2000, p. 6).

Regarding coping with a sports injury, when athletes are injured and incapable of taking part in physical activity they may encounter challenges when dealing with daily worries (Klenk, 2006). Cognitive coping strategies utilised by injured athletes include accepting the injury, focusing on getting better, thinking positively and using imagery (Brewer, 2007, p. 409). In a qualitative phenomenological study of fear and anxiety in extreme sport with athletes affiliated with base-jumping, big wave surfing, extreme skiing, waterfall kayaking, extreme mountaineering and solo rope-free climbing, Brymer and Schweitzer (2013) outlined participant sentiments, *'I could often feel the panic rising and I used to talk to myself and that used to sort of calm me down a bit... I was quick to get control, because once you start tightening up everything becomes more difficult.'* Another participant commented, *'I think that the ability to relax and stay focused and have a good clarity and good judgment in a situation of extreme danger comes down to experience to a certain degree'* (Brymer & Schweitzer, 2013, p. 482). Injured athletes who want to facilitate their recovery and return to sport can use psychological rehabilitation to their benefit by having an increased sense of responsibility and control over their recovery, leading to greater patient satisfaction, better quality care and a more complete and timely recovery (Taylor & Taylor, 1997, p. xxiv).

Concerning psychological interventions for sports injuries, descriptive and inferential studies have provided robust evidence for their significance, outlining the function of cognitive, emotional and behavioural components in biological and social frameworks of sport rehabilitation leading to the implementation of psychological skills interventions to enrich athletic rehabilitation (Brewer, 2007, p. 418). Goal-setting, relaxation, healing/performance imagery and modelling techniques can be effective in reducing or averting injury (Johnson & Podlog, 2014). Reece, Pittsinger and Yang (2012) reviewed interventions dealing with psychological outcomes of injured athletes and found that guided imagery and relaxation were effective in reducing post-injury psychological consequences and enhancing coping during rehabilitation while reducing re-injury anxiety. Evans, Hardy and Fleming (2000) examined a multi-model intervention through semi-structured interviews with athletes rehabilitating from

serious injuries and determined the efficacy of intervention components including social support, goal setting, imagery, simulation training and verbal persuasion.

In summary, vast research has been conducted on the psychological and coping elements of sports injuries. However, since extreme sports are still under expansion, little research of the topic has been conducted in this realm. No study has been specifically devoted to psychological effects and coping in extreme sports while providing applied guidance.

Purpose and Research Questions

This study explores how extreme sports injury affects an athlete's psychological well-being, it also determines which injury-related coping strategies are actively utilised. In addition, based on researchers' knowledge and experience, suggested mental skills tailored to each athlete will be presented to enhance coping. The following research questions guided the study: (a) how is physical trauma interconnected with mental disposition? and (b) which coping strategies are used by extreme sport athletes to deal with injury upshots? This study aims to fill the gaps in the literature and to provide the participants with support for re-current, chronic and potential injuries.

Methods

Participants

To facilitate the generalisability of the study we sought to involve athletes from different extreme sports. The first criterion for inclusion in the study was being an athlete of an extreme sport, based on the definition of extreme sports by Brymer, E. (2005) as *'independent adventure activities where a mismanaged mistake or accident is most likely to result in death'*. This ensured all participants fit the sporting classification and specialisation of the study. The second criterion was experience of an accidental injury due to participation in extreme sport (past or present), which in terms of severity required medical attention. This allowed the researcher to bring the practical side of this study to life by analysing the psychological upshot of physical trauma and offer mental skills to relieve psychosomatic symptoms and amplify athletic performance. The final criterion was a high-level of understanding and fluency in the English language. This ensured rich and vivid participant extracts and a well-defined analysis. In total 18 extreme sport athletes were contacted. 10 of these were available and prepared to take part including 4 rock-climbers, 2 snowboarders (1 with experience in surfing and 1 with experience in mountain biking), 1 motocross athlete, 1 wake-boarder, 1 white-water kayaker and 1 kite-surfer. The age range was from 26 – 31 years ($M = 28.4$, $SD = 1.57$). Experience in their injury-related sports ranged between 1 – 23 years. 8 out of the 10 athletes had participated in competitions in their sports.

Athlete 1: is a 30-year old male from Catalonia. He has been participating in the sport of motocross for 15 years and in the past, has competed to a season high-level as well as professionally.

Athlete 2: is a 26-year old female from Italy. She has been wakeboarding for 1 year and has been an avid rock-climber for 10 years.

Athlete 3: is a 28-year old male from Mexico. He has been rock-climbing for 23 years, competing often. He has recently switched predominantly to boulder climbing.

Athlete 4: is a 29-year old female from Greece. She is a regular competitor in the sport of rock-climbing which she has been engaged in for 13 years.

Athlete 5: is a 29-year old male from Greece. He has been rock-climbing for 10 years and competes frequently.

Athlete 6: is a 28-year old male from Greece. He has been rock-climbing for 9 years and is also a climbing instructor.

Athlete 7: is a 29-year old female from Poland. She is a professional snowboarder and instructor and a personal trainer and fitness instructor. She has been snowboarding for 18 years and mountain biking (MTB) for 4 years.

Athlete 8: is a 31-year old female from Ireland. She has been snowboarding for 3 years, surfing for 5 years and also engages in rock-climbing.

Athlete 9: is a 26-year old female from Ireland. She has been white-water kayaking for 7 years, competing often. She has also been an instructor in the sport.

Athlete 10: is a 28-year old female from The Czech Republic. She has been kite-surfing for 8 years and competes regularly.

Data Collection

This research was scrutinised and granted ethical approval by the University of Thessaly Ethics Committee. Participants who met the inclusion criteria were contacted via email and Facebook and invited to take part in the study. After reading a briefing document (Appendix B.) regarding research aims and signing a debriefing form (Appendix C.) athletes participated in a one-on-one open-ended, semi-structured interview on Skype and Google Hangouts. Interviews were arranged at a mutually convenient time. Participants were informed that they were free to withdraw at any time and that their data would be used for research purposes only. It was expressed that in the coming months they would receive tailored mental skills based on their data. This served as motivation to take part. The participants' demographics were noted including name, age, nationality, extreme sport and years of experience. The interview process addressed 3 main aspects, that of physiological impact (e.g., What type of injuries have you experienced in your sport? How would you rate the severity of your injuries?), psychological effects (e.g., Could you describe some of the emotions you experienced? Did this affect any competitions or your subsequent level of performance?) and coping mechanisms adopted & further guidance (e.g., Did you use any techniques to deal with what you went through? What advice would you offer others in the same situation in terms of coping?). Follow-up questions were asked to enrich the interview process and confirm the precision of the data. The 10 interviews varied from 17 – 46 minutes in length ($M = 31.7$, $SD = 9.49$) and were recorded via an android tablet.

Data Analysis

A 6-stage inductive thematic analysis based on Braun and Clark (2006) was used to identify psychological and coping characteristics of extreme sport injury. Inductive analysis is a coding method which does not seek to fit into a pre-existing coding framework or preconceptions, essentially making it a data-directed approach. This qualitative technique categorised, examined and reported themes within the data. All interviews were described verbatim with a total of 62 single spaced typed pages.

Firstly, transcripts were read and re-read for the researcher to gain a sound understanding and familiarisation of the data. Secondly, preliminary codes were developed by recording where and how patterns transpired. Thirdly, codes were grouped into predominant themes. Fourthly, codes and themes were evaluated in how they supported the data. Fifthly, each theme was defined and named. Sixthly, compelling excerpts were selected from the data that corresponded to the themes and research questions. Finally, documents of suggested mental skills were sent to each participant for recurrent or chronic psychological impact from injuries or potential future injuries. This process was checked by additional researchers to ensure accuracy and suitability. Skills included goal-setting, visualisation, relaxation, self-talk, pre-performance routines, confidence building and stress management.

Methodological Quality and Rigour

To ensure trustworthiness of the athletic data set, a four-phase criterion based on Guba and Lincoln (1985, pp. 289-315, 1989, pp. 233-236) was adhered to, that of internal validity (credibility) external validity (transferability), reliability (dependability) and confirmability. Credibility was accounted for with member checks by sending each participant their typed transcript for approval, ensuring their satisfaction and accuracy of findings and ultimately, to produce a credible study. Transferability was determined by selecting participants based on the precise target of the study and to provide for generalisability athletes from a variety of extreme sports were included. Dependability was certified by supervisory checks in the formulation of the study, the collection of the data as well as the interpretation of the findings and finally the narration of the results. Confirmability was established by the documentation of all procedures for checking and re-checking the interview data during the entire undertaking of the research. Strategies such as these are key for researchers as a means of improving research rigour and the value of findings (Krefting, 1991).

Results

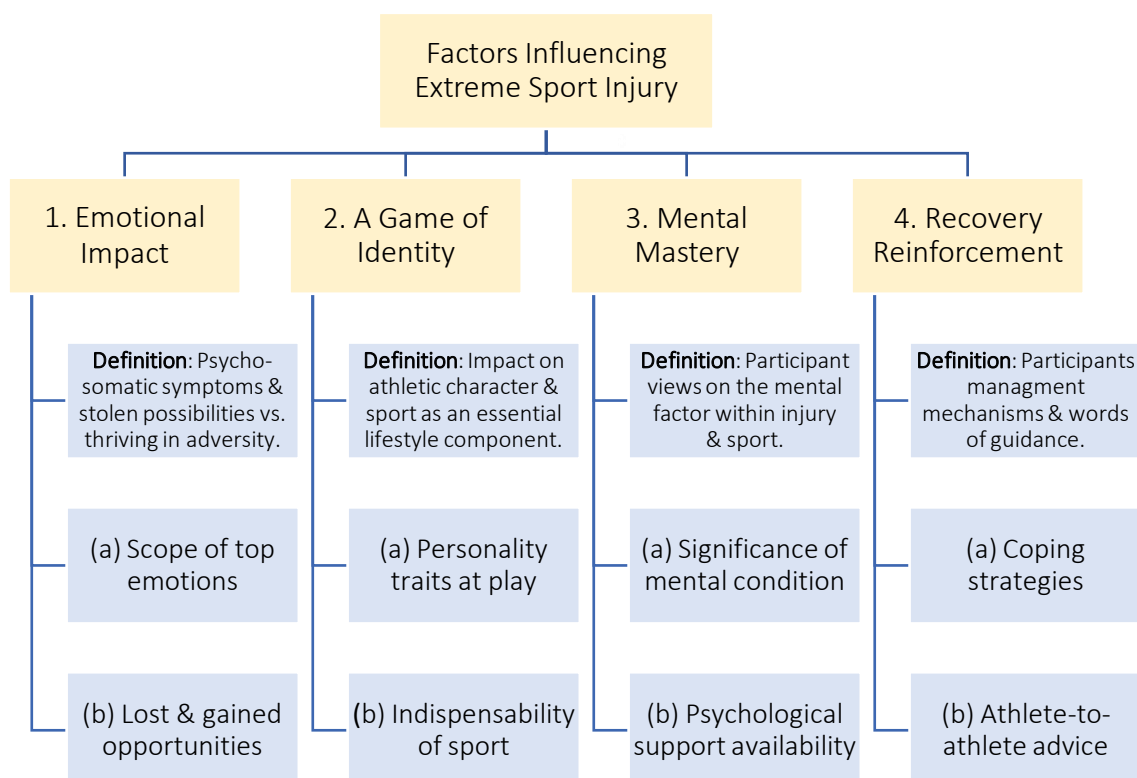
The interview data yielded 4 central themes, (1) emotional impact - with the sub-themes; scope of top emotions and lost and gained opportunities, (2) a game of identity - with the sub-themes; personality traits at play and indispensability of sport, (3) mental mastery - with sub-themes; significance of mental condition and psychological support availability and lastly, (4) recovery reinforcement - with sub-themes; coping strategies and athlete-to-athlete advice. The table below (Table 1.) outlines participant injuries as well as mental trauma. The following figure (Figure 1.) outlines all themes, subthemes and their definitions.

Table 1.

| Athlete & Sport | Injuries Sustained | Negative Emotions |
|--|---|--|
| Athlete 1 Motocross | - 27 broken bones - Concussions - ACL (Anterior Cruciate Ligament) knee tear | Frustration & fear |
| Athlete 2 Wakeboarding | - Bicep rupture | Worry, fear, frustration, stress & negativity |
| Athlete 3 Rock-climbing | - 3 shoulder dislocations - Twisted ankles | Paranoia, fear, insecurity, frustration, anger & feeling overwhelmed |
| Athlete 4 Rock-climbing | - Epicondylitis (Tennis Elbow) - Knee strain - Back strain | Disappointment, sadness, feelings of depression, irritation, nervousness, negativity & feeling overwhelmed |
| Athlete 5 Rock-climbing | - 2 finger pulley injuries - Labral shoulder tear - Biceps femoris thigh strain - Minor heel & elbow injuries | Frustration, worry, stress, anxiety & fear |
| Athlete 6 Rock-climbing | - Broken ankle - Minor injuries in hands, shoulders & elbow | Fear & sadness |
| Athlete 7 Snowboarding & Mountain biking | - Tailbone injuries - Head trauma (brain shakes) - Broken finger | Worry, fear, annoyance, anger, frustration, feelings of depression & stress |
| Athlete 8 Snowboarding & Surfing | - Neck strain - Sprained thumb - MCL (Medial Collateral Ligament) knee tear | Frustration, annoyance, anger & jealousy |
| Athlete 9 White-water kayaking | - Chronic shoulder injury | Frustration, anger, annoyance, worry, & fear |
| Athlete 10 Kite-surfing | - PCL (Posterior Cruciate Ligament) knee tear - MCL (Medial Collateral Ligament) knee tear - Twisted ankles - Tibia fracture - Bruised ribs | Fear, frustration & feelings of depression |

Athlete Specifications and Somatic / Psychosomatic Symptoms

Figure 1.

Themes and Definitions Significant in Athlete's Extreme Sport Injuries**Theme 1. Emotional Impact**

The frequency of negative injury-related emotions reported by extreme sport athletes were as follows; fear (8), frustration (8), anger (4), worry (4) feelings of depression (3), annoyance (3), stress (3) sadness (2), feeling overwhelmed (2), negativity (2), disappointment (1), paranoia (1), insecurity (1), irritation (1), nervousness (1), anxiety (1) and jealousy (1). The most commonly described negative psychological effects are explored in more detail.

(a) Scope of Top Emotions

Fear - Fear was a major component of the athlete's experience of injury. For most, it resulted in problematic feelings and reactions. The athletes found that on many occasions, fear took over and prevented them from progressing and getting back to the same level of performance they had pre-injury. One athlete identified that her fear was non-existent until after the point of injury when it caused her to consider short term after-effects related to athletic achievement and long-terms upshots such as the force of impact on the body at an older age.

I think until you get a serious injury you are with no fear and then you get a big injury and it kind of hangs around in your head. I was afraid that I wouldn't be able to be at the same level of before... I was afraid as well that what is gonna be when I gonna be old... how destroyed I gonna be by the age of forty, if we keep crashing in this way. (Athlete 10)

Another athlete reported that his fear disposition was not evident initially but subsequently came to the forefront as his physical condition deteriorated. This trepidation caused him to overthink and took some time to eradicate.

After a big injury... even though you think you're not scared, you're kind of scared and it takes a while to forget. I honestly thought there was something wrong with my spine and you get scared like not being able to move. (Athlete 1)

Lack of knowledge of the nature of an injury by medical practitioners led to a lack of acceptance and fear by another athlete. This lack of internal control amplified psychological trauma and was identified as the most detrimental element in the entire recovery process.

I was really scared that this would... make life impossible for example, I couldn't climb anymore or I couldn't do any wakeboarding anymore. For those two months, nobody had a clue what was happening so... that was the most scary moment. (Athlete 2)

One athlete outlined that his fear was so immense that it caused him to alter his style of participation in rock-climbing from rope-climbing to bouldering due to the fear of what may happen in a similarly challenging situation as the one that ensued during injury occurrence. In this case, fear overrides personal preference and takes control by setting limits. Several athletes also identified injury flashbacks as a significant set-back. This often occurred after recovery when doing a similar action or when on a similar route to where the injury took place. This allowed traumatic memories of the pain to resurface and delay or even halt progression.

Sometimes you get scared when you climb, and instead of admitting hey I was scared of the route, I would be like oh no no no, my shoulder was hurting so I let go... kinda like using that to justify myself and then also not to push so hard. When you're bouldering it's just a three metre rock... but when you're on a route and you're thirty metres off the ground, it's harder if you have an emergency... I did change to predominantly become a boulder climber. (Athlete 3)

Sometimes when I'm on a route that reminds me of the route that I broke my ankle, I might have a flashback from the fall and think about it and that scares me a lot. I can see that many times my fear don't allow me to climb at my physical limit, but when I am afraid I cannot push my limits, my physical limits. (Athlete 6)

Frustration - Frustration was a commonly experienced, disruptive emotion. It caused uncertainty and a lost sense of purpose. It had a strong influence on the majority of athletes, one outlined that it took over many facets of his life including exercise, sporting pursuits and general incentive which led to a state of vulnerability.

Of course, it was frustrating... I was planning on climbing a lot and I couldn't do anything so it was also just the motivation was like, I felt really, really bad... I felt I was gonna get weak... I had been training for 4 months, 5 and it's like all that goes to trash... you feel it was all useless... just a lot of overwhelming feelings. (Athlete 3)

The life-long process of training and physical preparation for competition or examination by some athletes was instantly jeopardised. This triggered a disorientated sense of self and loss of power.

It is frustrating, very frustrating... your body stops you from doing something (instructor test). It is frustrating because you're preparing yourself, like whole life for that and yeah and then you know you can't be 100 per cent... it is very like frustrating. (Athlete 7)

The importance of affordable and readily available healthcare was called into question by some athletes. It was conveyed that for many, private treatment is the only option due to the frequent and often critical injuries that are sustained in extreme sports. For others, this type of medical care is simply unfeasible, which intensifies pressure further and delays the vital recovery period.

I was frustrated and I didn't know how long it would take for me to get back on the water plus like the health system in Ireland, if you don't have private insurance, it takes longer to heal... that was our lifestyle and I was out because of the knee for almost a year. (Athlete 10)

Anger - Anger was a significant mental force exhibited upon injury occurrence and throughout rehabilitation. It resulted in athletes questioning themselves in relation to their rationale and execution of specific actions at the time of injury. One athlete detailed her step by step thought process, of blaming herself, examining the reality of her circumstance and then considering how she could have avoided her fate to prevent further mishaps.

I suppose I was kind of angry at myself for kind of falling... thinking oh what could I have done better? Thinking about how I managed to fall in that way, trying to rethink the movement and thinking oh I don't want to do that again, what exactly happened? Can I avoid doing that again? (Athlete 8)

Anger was also evident within recurrent or chronic injuries. The fact that training was impacted and progression often immobilised took a great toll. This was illustrated by one athlete who also questioned herself.

I would just get really angry at myself and why can't I keep going you know? But it's just so sore that I can't. (Athlete 9)

Worry - Worry habitually transpired when an athlete was uninformed of the classification and severity of their injuries. It led many to be unsure of their next step in terms of recovery and subsequent level of performance. It also caused some to incorrectly judge the gravity of their physical condition. Two athletes described how their worry influenced them.

The first emotion is ok what do I have now? What happened now? So until I know what did I have, I was a bit worried that it could be much more severe. (Athlete 5)

I started to get really worried because I thought there was some real damage done. We're going on a white-water kayaking trip to Slovenia in May... I'm just worried my performance there is not going to be so good... I am quite worried about that yeah cause I've been looking forward to this trip for so long. (Athlete 9)

Feelings of Depression - A depressed mindset was revealed in some cases due to perception of the injury, the time it would take to heal, the impact it would have on their routine and how this may negatively affect post-recovery workout or performance. One athlete stated that the significance of her sport being snatched away had made her feel overwhelmed and inadequate.

It makes me very sad, it still makes me feel that I will never become, I will never reach the level that I had before and it's very disappointing... It makes me very depressed, because rock-climbing is my life you know. (Athlete 4)

Others commented that it had considerably impacted professional successes, general mobility, psychological disposition and made for a stark reminder of their reality which consequently brought about their feelings of depression.

I was very depressed... I was very depressed after all it happened, even I passed the exam (instructor exam) and I passed and everything was fine in the end... but then you do not get the score you want. (Athlete 7)

I'm a very active person so if I have to stay off activities, I get depressed... so it affected me then a lot because you don't know how much you cannot do until you cannot do something and I couldn't do anything like because of I couldn't walk so yeah it affected my daily life and mental health in a big way. (Athlete 10)

(b) Lost & Gained Opportunities

As the athletes reflected upon their experience, they described the upshots of sustaining an extreme sport related injury, both positive and negative. Many felt as though rewarding and meaning possibilities had been stolen. Others experienced encouraging consequences and thrived in adversity. Many experienced both factors. In some cases, athlete's professions and education were impacted, uncovering numerous after-effects which took over entirely until recovery was completed.

You couldn't do anything so it was strange not to be able to have my mobility. I couldn't work because I'm a climbing instructor, so I was out of work for four or five months. (Athlete 6)

I didn't want to study, I didn't want to do whatever I had to do, I had to do an internship and I was not very motivated to do anything else... I just had to postpone my graduation 6 months... I felt like I had to concentrate in first solving my issues and then focus on school. (Athlete 2)

Furthermore, for some, participation in competitions and the prospect of competing professionally was jeopardised despite the athlete's expectations and commitment. This demonstrates the gravity of their experience and portrayed a sense of vulnerability.

I had skipped 2 competitions because I wasn't really able to ride. I wanted to join British tour as well and anyway that went out the window, so yes it was pretty bad. (Athlete 10)

I was climbing really strong at that point in my life... everybody had so much expectations of me, I was like all the time like training really hard and all of a sudden... everything stops dead... you know I blew my chance at having a career in this sport. (Athlete 3)

Some athletes succeeded in capitalising from their downfall. They persisted and managed to put their attention into other projects, making the most of their physical ordeal and using their extra free-time constructively. This gave them the chance to spend time with people who they had not seen often due to the demand of training and competition. Taking advantage of their injury was a method of passing the time quickly. Their control of the situation which was seized without warning upon injury, was somewhat recovered.

It was always tough in the beginning, any injury... you feel that the others are progressing and you're not, so in the beginning it was always tough but then at the same time it was actually ok to like get away from the sport for a little bit... I get to do things that I normally, I cannot... which is like hanging out with friends and stuff. (Athlete 1)

The good thing is, in other parts of my life it actually paid quite well because when I had the first injury in my finger, I got really dedicated in finishing my Bachelors degree, so I turned all my attention over that... and generally that's what I do, I relocate my attention, just to forget the injury and deal with something else. (Athlete 5)

Theme 2. A Game of Identity

The theme of identity was highlighted within the interview data. Many athletes specified that their sport is not simply a hobby but an outlet that develops psychosocial aspects such self-respect and self-esteem and gives them a sense of belonging and purpose. Their sport cultivates maturation and motivation. Others believe it is imperative to be attentive to other areas of life and not to have all aspirations dependent on sporting accomplishments. This granted them the opportunity to develop themselves in other capacities and be well-rounded.

(a) Personality Traits at Play

It was revealed that some athletes were so passionate about their sport that it had become a core part of their identity. Sport participation and performance led to individuality and self-worth. However, one athlete expressed that eventually his sporting identity initiated a negative ego mind-set. Through awareness and being pro-active, this outlook was avoided and self-development was continued.

Basically, I was rock-climbing, you know like nobody ever knew me separated from rock-climbing... rock-climbing and Miguel went together... at some point I actually wanted them to go together because of an ego attitude... at some point after so many injuries and after like many bumps in life you know, you understand that it's not about the ego, it's more about like, your own personal like journey. (Athlete 2)

Another athlete identified that an ego and boasting attitude is merely a part of some extreme sports. She divulged that this mentality-type is the norm in some high-levels sports. In such a case, after a minor fall for instance, an athlete would be met with compliments rather than empathy or compassion.

When I was out in New Zealand doing the season... everyone is out there every single day... there was no kind of oh I came off my board, or I had a fall over there, it was more like I had a brilliant fall and a lot of bravado and ego involved in it as opposed to a supportive culture. I've had massive falls where I've tumbled head over heels a bunch of times... and immediately when I came down it wasn't oh are you ok? It was, nice fall! So I guess then what are you expected to say that actually it was a terrible fall... yeah it really hurt... you don't, it's not human behaviour. Your ego is bruised, but it's bruised even more if you say something like, I admit that it was... really silly to fall there. (Athlete 8)

One athlete commented that meaning in her life comes solely from sport and her athletic identity. This internalisation gives her a clear sense of herself and who she is in sport and allows her stresses to disappear. However, it also causes an identity crisis and feelings of emptiness in other areas of life.

When I climb it's the only moments in my life that I feel fulfilled. I don't have any problems, I don't care about money, I don't care about anything else, I just climb and focus on that. It is the activity but it's not only the activity, is also that you go outdoors and you are surrounded by good people and you climb in the nature... it's all these emotions that rock-climbing creates. (Athlete 4)

The importance of having a sense of equilibrium in life was outlined. It was emphasised that it is common for individuals to have a narrow outlook which prevents them from finding fulfilment in other aspects of life. Whereas deeming sport to be simply another interest resulted in a more well-adjusted disposition.

Compared to other climbers, I have a much more larger social life and working life and even though I'm quite dedicated sometimes in climbing, I know it's still a hobby... I'm doing it just to have fun. Generally, people do not see the full size of the picture... there are many other things in life. (Athlete 5)

Pro-riders or pro-athletes, they are focused on one thing so, if this is getting bad all their lives is ruined because every single thing in their lives is concentrated on this. I have other things around me that makes me happy you know and that I can work for and that I can develop myself. (Athlete 7)

(b) Indispensability of Sport

A collective pattern within the data was the value of sports. It was described as an outlet necessary for survival. Other were comfortable with it simply being a pastime. Those who were more dependent on sport found they could push the boundaries of their health, influence their mind-set and considered sport to be a part of intrinsic functioning. One athlete detailed how sport enhanced overall satisfaction. It was described as crucial and comparable to that of an addiction. The option of quitting was dismissed and progress was considered limitless.

If I'm not able to ride I'm not as happy... I feel I'm always a happy person but when I ride, I feel much better... I really need it, I don't think I'll ever quit because I need it, it's like a drug definitely. (Athlete 1)

Another athlete declared that even though the odds were stacked against him due to professional advice, he persisted. He did so until he had achieved his rehabilitation goals and returned to sport. Hardships were perceived purely as challenges indicating a high level of motivation and the ability to retain a positive disposition.

I went to see this specialist of Mexico City who is like the highest authority when it comes to shoulders and he said... you won't be able to climb ever. My aunt, she's an orthopaedist and she knows I'm never going to stop climbing... I had to go every day like for one hour of recovery... I felt I was cheating all that... it was me trolling my own body. (Athlete 3)

Sport identity as part of human identity was reiterated by one athlete who described when interests and passions are deemed meaningful, it touches upon one's character. Something that may have once been external to the self then becomes a part of it, making it indispensable.

Everything dices up, everything we love, everything we do, everything we say, I guess it's all a part of us, even the things that we do like our hobbies. (Athlete 8)

Theme 3. Mental Mastery

The magnitude of maintaining the psychological condition was emphasised by all athletes. It was something that many were continuously enhancing. A crucial query put to all athletes in this research was what was their greatest challenge in relation to their injury - physical injuries, psychological trauma, or both? Their responses were as follows; physical (4), psychological (3) and both physical and psychological (3). This section outlines how the mind-set can impact recovery and the return to sport.

(a) Significance of Mental Condition

One athlete indicated that psychological consequences of an injury can have a greater impact than the physical. This implies that despite pain, discomfort and the rigors of rehabilitation, in many cases, mental elements can dominate.

I think definitely at least in these sports... coming back from injury is more what's here in the head than actually the injury itself. (Athlete 1)

The mind-body connection was highlighted. One athlete detailed that sports are now so advanced in terms of safety that injury occurrence is ultimately down to an individual's level of mental toughness. Another stated that the mind is what guides the body and that mentality is key to reaching your performance potential. This demonstrates the somatic and

psychosomatic link where thoughts and emotions can impact the execution of a sport as well as rates of injury.

Basically it's your mind, leading your body so it's always about your perception, your feeling. In general, in extreme sports I think because the safety level nowadays in climbing and I'm sure in wakeboarding the same, the safety has reached so high standard, that the only mistake that can happen depends on you, that you did something wrong or you were too scared or too confident and you forgot to do something, so the mental issue is I think the priority in extreme sports. (Athlete 2)

I think we as humans, I think it's mostly in our head. I think the mind kind of leads the body. If you wanna make it... in this sport, you have to kind of say go big or go home... that kind of mindset you have to have in the head so you go out and do your best. (Athlete 10)

One athlete indicated that despite being prepared physically, his mental state prevented him from participation for some time. This was a direct result of overlooking his emotions. This point stresses the importance of continual emotional regulation. Another athlete commented that a healthy frame of mind is fundamental for sport and well-being. This signifies that, depending on individual resilience, negative consequences can overspill into other areas of life. The value of a healthy mental state was illustrated by a third athlete as an imperative aspect of sport and when disrupted, prevented him from exerting maximum effort. These points accentuate the benefit of psychological development as part of an athletes holistic training.

When you've been climbing all your life... you don't really notice sometimes your emotions, you don't really notice the psychological part. I just came back from an injury... my muscles were ready, my body was ready and I just kind of kept dragging myself down, I think definitely the psychological part... was always harder for me. (Athlete 3)

Rock-climbing is a very emotional sport, when you don't feel well with yourself, then you do not perform well. I think those injuries can make me feel psychologically, make me feel very bad, they affect my whole life, when I don't feel well in rock-climbing then I don't feel well in my normal life. (Athlete 4)

One third of climbing is mentality so not being able to think clearly, being afraid, reduced my ability to climb on my absolute limit, so I had to climb easier stuff just to be safe. (Athlete 6)

It was indicated that it is necessary for some athletes to heighten mental resilience further to combat extreme sports fears when under pressure in a risky situation. This would help prevent choking, allow the individual to continuously improve and essentially perform at their peak.

Your mentality is the number one thing that's stopping you from progressing in all the sports that I do... especially in white water kayaking I've been progressing quite a lot and I've been doing bigger water... more dangerous situations... your head needs to be in the right place... because if you're looking at you know a waterfall or a rapid or something and all your thinking of is there's a part there where I could die... it's a huge mental game absolutely... it's just trying to get that thought out of your head... it's a difficult thing to do, but once you do, the progression is just exponential. (Athlete 9)

(b) Psychological Support Availability

The extent to which psychological support is readily available for injured extreme sport athletes was revealed as limited. One athlete expressed that often it is only after a severe injury that an athlete will consider maintaining their mental disposition. The need for additional psychological provisions was reported.

I think people are focusing more on the physical part, to get stronger and to get fitter and the psychological comes like afterwards when you had a bad experience or a near to death experience... I don't think there is much support for that... I'm sure in these kind of sports it's needed, it's needed much more than what is done nowadays. (Athlete 2)

A concern was revealed for the mental state of the newest generation of extreme sports athletes. It was disclosed that this group would benefit from receiving professional support and direction. The requirement of psychological support in extreme sports was highlighted by the comparison to lower risks sports, consequently revealing mental reinforcement as an essential factor.

There must be like a lot of kids you know that get injured or different kind of people, they would benefit a lot from psychological help during an injury or even before it... our sports are getting crazier you know, you're not just kicking a ball... an accident can actually kill you... so it's really important that you understand... that like sometimes you need proper psychological treatment. (Athlete 3)

The lack of current psychological support was reiterated by another athlete who disclosed that encouragement comes from the individual's friends or teammates. These points illustrate the urgent need to make athletes aware of the importance of mastering their mind-set and making psychological intervention for injury commonplace.

I don't think there's really any professional help, like readily available... it's literally just like peers would be trying to convince the person to go back in to the sport. It really depends on where the person is, whether or not they can actually continue after an injury or like a near death experience... in kayaking, surfing as well... any kind of water sport cause that element of droning just increases the risk so much. (Athlete 9)

Theme 4. Recovery Reinforcement

Effective coping skills helped athletes buffer the negative upshots of their injury. These management techniques were successful in dealing with numerous stressors and rehabilitation setbacks from physical trauma and in turn promoted physiological healing. The following Figure (Figure 2.) outlines collective participant coping strategies.

Figure 2.

(a) Athlete Coping Strategies



Note. Injury-related coping mechanisms adopted.

(b) Athlete-to-Athlete Advice

A vital purpose of this study is to provide direct council from the participants of this study to others extreme sport athletes and competitors. It is important that council be given from a primary source to enhance coping with an injury, completing recovery successfully and returning to sport while resuming previous levels of performance. This section provides athlete-to-athlete advice for achieving these sporting goals.

One athlete illustrates that your mind-set is key when managing an injury. With a clear-cut perspective of the rationale of participating in sport, it allows to you consider an injury as an obstacle and open yourself up to a wealth of possibility.

You have to change your mentality... if you change and understand that you're actually doing the sport because you love it, because it's a process of developing you as a human being and developing other human beings, then for sure... it's easier to understand every like injury as a challenge. (Athlete 3)

Another athlete states that it is crucial not to conclude the rehabilitation period prematurely which is a common occurrence with dedicated individuals. Additionally, your environment including your close-knit circle can play a major part in the healing process.

Be patient, because life is long, there's life after racing... I was coaching a few guys in the last two years and I've seen terrible injuries and they just think about getting back to the bike but there's life after it. Have the right people around, I think in sports it's really, really important to have a good circle of people around and normally with athletes who are successful, it's tough to have the right people around, cause you have people that are there because of the fame, success, money... but to have the right doctors, the trainers, the right girl-friend, the right family, it's really important. (Athlete 1)

The magnitude of seeking and receiving support from healthcare professionals was portrayed. This may protect the individual against further injury or may alleviate physical symptoms and negative stressors and prevent more acute ramifications.

Get the support from the professional... after the injury is the most important whether it's physical or mental you know... so straight away if you have a lack of knowledge, if you have a lack of support, go to the professional, whether is psychologist, or physio or personal trainer. (Athlete 7)

This was reiterated by another athlete describing it as a means of easing mental worries. The benefits of implementing mental skills training into sports education, particularly for

beginners, was indicated. This was stated as being of paramount importance to get over fears or anxiety in extreme sports and to learn essential lessons which may effectively save a life.

Definitely get professional advice, it's really good to kind of mentally, to put your mind at ease. But actually, talking to a professional really helps because it kind of helps the motivation and you know exactly what you have to do... even if it's just for a mental cushion. There does need to be an emphasis when people are learning these sports, how to get over that mental block. I taught a bit of kayaking, and the worst thing, trying to get kids to capsize and get out of the boat, they wouldn't do it, they were so afraid of just getting stuck and drowning that it was impossible to get them to do it even though it's one of the most important things to do, is to learn how to get yourself out of a bad situation. But I don't think there's that much emphasis on this... that kind of education, to be brought in to extreme sports, it's really endurable. (Athlete 9)

Applied Approach to Extreme Sports Injury (Feedback)

The results of this research support the value of psychological intervention within the field of sport injury rehabilitation, corresponding to previous research (Crossman, 1997; Wagman & Khelifa, 1996). The final part of this research incorporates an applied sports psychology approach. Based on athlete's experiences and stressors, mental skills are suggested tailored to each case. These practical skills are intended for the athletes of this study to manage recurrent or chronic issues and enhance coping in relation to potential injuries. It also provides the current and future generation of extreme sports athletes with an advisory guide for peak performance and mental conditioning. A total of nine skills are applied, the precise type of skill and the frequency in which they were advised are as follows; thought logs (9), goal-setting (7), visualisation (7), progressive muscle relaxation (PMR) (6), mindfulness (5), diaphragmatic breathing (4), self-talk (4), pre-performance routines (2) and music (1). The following table (Table 2.) specifies the skills suggested and provides the rationale behind each choice.

Table 2.

Mental Skills Advised

| Athlete & Sport | Mental Skills | Injury Related Issue |
|--|--|---|
| <u>Athlete 1</u> Motocross | <ul style="list-style-type: none"> • Goal Setting: • Diaphragmatic breathing & PMR:¹ • Thought log - negative self-evaluations:² • Visualisation: | <ul style="list-style-type: none"> - For frustration at lack of progression & missing competitions. - For short-term and long-term pain relief. - For decreased satisfaction when unable to ride. - For fear and overthinking after injury. |
| <u>Athlete 2</u> Wakeboarding | <ul style="list-style-type: none"> • Mindfulness: • Self-talk: • Goal setting: | <ul style="list-style-type: none"> - For pain alleviation, lack of control and failure to cope. - For negative thought patterns. - For fear of being unable to continue in sports. |
| <u>Athlete 3</u> Rock-climbing | <ul style="list-style-type: none"> • Thought log - confidence boost:³ • Diaphragmatic breathing & visualisation: • Self-talk & thought log - distress:⁴ | <ul style="list-style-type: none"> - To boost self-assurance & repair impact on sporting identity. - For pain relief. - For anger, frustration and pressure. |
| <u>Athlete 4</u> Rock-climbing | <ul style="list-style-type: none"> • Pre-performance routines: • Motivational / calming music: • Mindfulness, visualisation & PMR: • Thought log - challenging negativity⁵ • Self-talk & goal setting: | <ul style="list-style-type: none"> - To boost subsequent performance, focus and attention. - For energy management (psych-up, psych-down). - For pain control. - To deal with negative emotions. - For increased motivation in areas outside of sport. |
| <u>Athlete 5</u> Rock-climbing | <ul style="list-style-type: none"> • Thought log - tracking mind & body ABC's⁶ • Self-talk & goal setting: • Visualisation: • PMR: | <ul style="list-style-type: none"> - For stress and worry about being unfit & unable to compete. - For frustration at reduced mobility and halted advancement. - For fear of re-injury and imagining negative scenarios. - For pain relief and reduced tension. |
| <u>Athlete 6</u> Rock-climbing | <ul style="list-style-type: none"> • Diaphragmatic breathing & visualisation: • Pre-performance routines & goal setting: • Mindfulness: | <ul style="list-style-type: none"> - For fear and negative flashbacks associated with injury. - To refocus performance aims and clear the mind. - To improve levels of satisfaction and cope with pain. |
| <u>Athlete 7</u> Snowboarding & Mountain biking | <ul style="list-style-type: none"> • Thought log - controllables⁷ & goal setting: • Mindfulness: • Visualisation: | <ul style="list-style-type: none"> - For stress & feelings of depression due to activity restriction. - For coping with pain and the impact of the injury on daily life. - To deal with memories of the pain after recovery. |
| <u>Athlete 8</u> Snowboarding & Surfing | <ul style="list-style-type: none"> • Thought log - negative self-evaluations² • Goal setting: • PMR: • Diaphragmatic breathing: | <ul style="list-style-type: none"> - For anger at oneself for causing injury. - For feeling a lack of injury management. - To alleviate short-term pain & cope with long-term pain. - For frustration at lack of progression and restriction. |
| <u>Athlete 9</u> White-water kayaking | <ul style="list-style-type: none"> • Thought log - moving beyond fear⁸ • Mindfulness: • PMR: | <ul style="list-style-type: none"> - For performance fears, frustrations, anger and annoyance. - To manage the impact of injury on everyday activities. - To ease pain and worry. |
| <u>Athlete 10</u> Kite-surfing | <ul style="list-style-type: none"> • Thought log - overcoming fear⁹ • Visualisation: • PMR: | <ul style="list-style-type: none"> - For performance & health fears. - For feelings of depression during lifestyle alteration. - For pain relief and reduced pressure. |

Note. Researcher advised mental skills for psychological symptoms of injury to enhance mental toughness.

¹ PMR – Progressive Muscle Relaxation; deep muscle relaxation

² Thought log -negative self-evaluations; challenging negative & irrational thoughts

³ Thought log - confidence boost; positive qualities record; achievements, skills & strengths

⁴ Thought log - distress; dealing with distressing thoughts

⁵ Thought log - challenging negativity – adjusting irrational & negative thoughts

⁶ Thought log - tracking mind & body ABC's– activating event, beliefs and consequences

⁷ Thought log - controllables; factors inside & outside of one's control in sport

⁸ Thought log - moving beyond fear; managing fears & limiting beliefs

⁹ Thought log - overcoming fear; defusion, acceptance, realistic goals & embracing values

Discussion

Extreme sports have developed considerably and gained vast popularity in the past few decades and are now performed both by adventurous elite athletes and thrill-seeking recreational sportspeople (Mei-Dan & Langran, 2012, p. xi). Participants of extreme sports endure a certain level of risk of injury, spanning from minor abrasions and over-use injuries to fatal and catastrophic injuries (Henjum & Dudley, 2016, p. 337). A significant need for well-designed intervention studies aiming to improve post-injury psychological outcomes and facilitate successful recovery has been identified (Reece, Pittsinger, & Yang, 2012). The objectives of this study were to explore how extreme sports injury affects an athlete's psychological well-being, to determine coping strategies actively used and to present mental skills to enhance coping of re-current, chronic and potential injuries.

The findings of the current study are consistent to that of existing literature in identifying commonly experienced emotions in the post-injury phase (Crossman, 1997; Klenk, 2006; Smith, Scott, & Wiese, 1990; Walker, Thatcher, & Lavalley, 2007) as fear, frustration, anger worry and feelings of depression. While all athletes varied in their reactions and feelings towards their injury, these emotions were dominant across the data set. Fear included dimensions such as performance fears, long-term health fears, injury-severity fears, fears related to delayed diagnosis and flashbacks. Frustration was related to halted exercise pursuits, decreased motivation and healthcare options available. Anger was related to athletes blaming themselves and the impact of injury on training and progression. Worry was connected to being unaware about the severity of the injury and outcomes in relation to subsequent performance. Feeling of depression were linked with perceptions of the injury and healing time, impact on daily routine, performance level and mental health. This research adds less commonly observed emotions such as paranoia (in relation to further injury), insecurity (regarding pushing performance limits too far), irritation and nervousness (in other areas of life when unable to participate in sport), jealousy (of others taking part in sport), and feeling overwhelmed (due to a lack of incentive and wasted training) indicating the vast extent of emotions involved in the recovery period.

Lost opportunities reported correspond with previous research (Evans, Wadley, Hanton, & Mitchell, 2012), as well the negative effects of injury such as impact on career, education, mobility and competition, the athletes also outline positive effects similar to previous literature (Tracy, 2003), where their optimism allowed them to work through rehabilitation and use their free time constructively through socialising and academic progression. This suggests persistence and a motivational drive to succeed despite adversity. Athletic identity concerns during injury were revealed as consistent with previous studies (Brewer, Van Raalte, & Linder, 1993; Klenk, 2006; Mankad, Gordon, & Wallman, 2009) and signified that sport is a core part of the athlete's identity. This study extends the existing body of literature in revealing that bravado and egotistical attitudes are common in the realm of extreme sports. This factor impacted upon external support from peers and obstructed personal development. This indicates that confidence at certain levels of sports is crucial. Indispensability of sport for athletes resembles previous research (Klenk, 2006). This study reports this in terms of dependency of sport in enhancing satisfaction. The necessity of sport facilitated persistence in recovery and the value of sport was internalised. This signifies that athletes often rely heavily on sport for fulfilment and purpose.

Outcomes of this study reproduce previous findings in indicating the significance of psychological factors in the construction of injury rehabilitation programmes (Brewer, Van Raalte, & Linder, 1991; Pearson & Jones, 1992; Wiese, Weiss, & Yukelson, 1991). Rather than offering insights of the importance of sports psychology within injury recovery from the usual perspective of medical practitioners and athletic trainers (Larson, Starkey, & Zaichkowsky, 1996; Wiese, Weiss, & Yukelson, 1991), this study emphasised the athletes perspective. In some cases, athletes found psychological effects more demanding than physical effects which parallels previous research (Crossman, 1997). This signifies the magnitude of injury-related psychological treatment. Mental resilience was perceived to be linked to the effective execution and progression of sport, reduced rates of injury, decreased disruption in performance post-injury and overall wellbeing. Psychological development was perceived to be associated with aiding extreme sports fears, decreasing choking and contributing to peak performance. Psychological provisions for injured athletes was revealed as limited, despite its perceived value, also reported in previous literature (Taylor & Taylor, 1997, p. xxiv). The risk within extreme sports was emphasised as a focal point in terms of consideration of psychological support which often was only offered by peers and family members. Mental toughness was identified as being vital in extreme sports which is backed

up by previous research (Guthrie, 2008). A concern was expressed for the new generation of extreme sports athletes and their ability to be mentally tough. These points suggest the influence of the mental state in several noteworthy features of recuperation and health.

Elements of coping included social support, trusting medical treatment, having the motivation to recover and restore performance level, focusing on fitness and strength and conditioning training to prevent re-injury, being rational, tracking rehabilitation progress, acceptance, distraction, optimism and meditation, corresponding to current studies (Gould, Bridges, Udry, & Beck, 1997; Klenk, 2006). These strategies indicate the value of external support, a vigorous mental disposition and adherence to rehabilitation goals. Athlete-to-athlete guidance by participants included being patient, getting professional advice when needed, surrounding oneself with the right people and adjusting to a developmental / task orientation if one was focused on ego orientated aims. The latter indicates the perceived importance of personal improvement which is also identified in foregoing research (Duda, 1989).

Strengths and innovative aspects of this research include taking the research process a step further and presenting mental skills to facilitate recovery based on issues described by the participants themselves. This gives the athletes of this study an opportunity to receive psychological management for setbacks such as stress, frustration, lack of motivation and feelings of depression etc. It also provides direction for potential injury-related symptoms. As outlined in the results, psychological treatment was deemed limited despite its perceived advantage. Primary source insights are provided for experienced extreme sports athletes to be aware of the state of their mind-set and the possible need for emotional regulation. This is also relevant for beginners, and as expressed in the findings this group is perceived as particularly vulnerable to extreme sports fears. Participant advice offered is a unique aspect of this study and one which has not been reported previously. The research questions of this study with this specific set of participants, types of extreme sports and range of acute and chronic injuries has not been examined before allowing for the narration of distinctive experiences.

By emphasising the benefits of addressing both physical and psychological impacts of injury in extreme sports, the findings have important implications for coaches, trainers and medical professionals in recognising the need for mediation of overall wellbeing. Mental skills advised by researchers are principally intended for sports associated mental strain. However, these skills can be exercised outside of sport to optimise performance and develop mental

resilience, (Cohen, 2016, p. 3) demonstrating its use for a wide variety of readers of this research.

A potential limitation of this study was recall bias. Reporting a past experience can be threatened by an individual's memory and exposure status, with a possible effect on internal validity (Hassan, 2006). An attempt was made by researchers to minimise recall bias. This was executed by ensuring all points made during the interviews were understood clearly. Respondent validation was certified and all participants agreed with how the information was presented. This assisting in refining themes and allowing for precision (Burnard, Gill, Stewart, Treasure, & Chadwick, 2008).

A follow-up investigation could concentrate on the athletes of this study by collecting feedback on the effectiveness of suggested mental skills. It is recommended that future research focus on psychological effects comparisons based on severity and extreme sport type. In addition, future exploration should aim to implement further well-constructed psychological intervention studies within the sphere of extreme sport injury and within clinical populations outside of sport who may benefit similarly.

Conclusions

Overall, this study is a valuable addition to the current understanding of psychological effects and coping within extreme sports injury. Results emphasise the advantages of treating extreme sports injury holistically, focusing on both physical and psychological factors. Findings provide an extensive range of emotional responses. It accounts for both losses and gains of injury. This research gives athletes a voice on whether psychological support is needed for effective recuperation and gives them the opportunity to pass on words of wisdom to others in terms of coping. If an athlete is struggling due to cognitive, behavioural or emotional elements of injury then psychological intervention would be of benefit in reducing destructive effects, averting further harm and fast-track the healing process and return to sport.

References

- Andersen, M. B., & Williams, J. M. (1988). A model of stress and athletic injury: Prediction and prevention. *Journal of sport and exercise psychology*, 10(3), 294-306.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Breton, D. L. (2000). Playing symbolically with death in extreme sports. *Body & Society*, 6(1), 1-11.
- Brewer B. W. (2007) Psychology of sports injury rehabilitation. In Tenenbaum, G., & Eklund, R. C. (Eds.), *Handbook of sports psychology* (p. 409). John Wiley & Sons.
- Brewer, B. W., Van Raalte, J. L., & Linder, D. E. (1991). Role of the sport psychologist in treating injured athletes: A survey of sports medicine providers. *Journal of Applied Sport Psychology*, 3(2), 183-190.
- Brewer, B. W., Van Raalte, J. L., & Linder, D. E. (1993). Athletic identity: Hercules' muscles or Achilles heel?. *International journal of sport psychology*.
- Brewer, B. W., Van Raalte, J. L., & Linder, D. E. (1993). Athletic identity: Hercules' muscles or Achilles heel? *International journal of sport psychology*.
- Brymer, E. (2005). Extreme dude: A phenomenological exploration into the extreme sport experience. *Unpublished doctoral dissertation, University of Wollongong, Wollongong*.
- Brymer, E. (2010). Risk taking in extreme sports: A phenomenological perspective. *Annals of Leisure Research*, 13(1-2), 218-238.
- Brymer, E. & Houge McKenzie, S. (2016) Psychology and the extreme sport experience. In Feletti, F. (Ed.), *Extreme Sports Medicine*, (p. 4). Springer.
- Brymer, E., & Schweitzer, R. (2013). Extreme sports are good for your health: a phenomenological understanding of fear and anxiety in extreme sport. *Journal of health psychology*, 18(4), 477-487.

- Brymer, G. E. (2005). Extreme dude! A phenomenological perspective on the extreme sport experience.
- Burnard, P., Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Analysing and presenting qualitative data. *British dental journal*, 204(8), 429-432.
- Cohen, R. (2016). *Sport Psychology: The Basics: Optimising Human Performance*, (p. 3). Bloomsbury Publishing.
- Crossman, J. (1997). Psychological rehabilitation from sports injuries. *Sports medicine*, 23(5), 333-339.
- Duda, J. L. (1989). Relationship between task and ego orientation and the perceived purpose of sport among high school athletes. *Journal of sport and exercise psychology*, 11(3), 318-335.
- Eurosafe (2013) Injuries in the European Union. Summary of injury statistics for the years 2008-2010. http://ec.europa.eu/health/data_collection/docs/idb_report_2013_en.pdf.
- Evans, L., Hardy, L., & Fleming, S. (2000). Intervention strategies with injured athletes: An action research study. *The Sport Psychologist*, 14(2), 188-206.
- Evans, L., Wadey, R., Hanton, S., & Mitchell, I. (2012). Stressors experienced by injured athletes. *Journal of sports sciences*, 30(9), 917-927.
- Gobbi, A., Tuy, B., & Panuncialman, I. (2004). The incidence of motocross injuries: a 12-year investigation. *Knee surgery, sports traumatology, arthroscopy*, 12(6), 574-580.
- Gould, D., Bridges, D., Udry, E., & Beck, L. (1997). Coping with season-ending injuries. *The Sport Psychologist*, 11(4), 379-399.
- Guba, E. G., & Lincoln, Y. S. (1989). *Fourth generation evaluation*, (pp. 233-236). Sage.
- Guthrie, C. (2008). *Life at the extreme: An investigation into the experiences of professional sailors competing in a fully crewed around the world ocean race* (Doctoral dissertation, Temple University).

- Hassan, E. (2006). Recall bias can be a threat to retrospective and prospective research designs. *The Internet Journal of Epidemiology*, 3(2), 339-412.
- Henjum, M., & Dudley, J., (2016) Training and injury prevention strategies in extreme sports. In Feletti, F. (Ed.), *Extreme Sports Medicine*, (p. 337). Springer.
- Johnson, U., & Podlog, L. (2014) Sports injuries. In Papaionnou, A. G., & Hackfort, D. (Eds.), *Routledge companion to sport and exercise psychology: global perspectives and fundamental concepts* (pp. 879-885). Routledge.
- Junge, A. (2000). The influence of psychological factors on sports injuries. *The American Journal of Sports Medicine*, 28(5_suppl), 10-15.
- Klenk, C. A. (2006). Psychological response to injury, recovery, and social support: A survey of athletes at an NCAA division I university. *Senior Honors Projects*, 9.
- Krefting, L. (1991). Rigor in qualitative research: The assessment of trustworthiness. *American journal of occupational therapy*, 45(3), 214-222.
- Larson, G. A., Starkey, C., & Zaichowsky, L. D. (1996). Psychological aspects of athletic injuries as perceived by athletic trainers. *The Sport Psychologist*, 10(1), 37-47.
- Laver, L., Pengas, I. P., & Mei-Dan, O. (2017). Injuries in extreme sports. *Journal of orthopaedic surgery and research*, 12(1), 59.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry* (Vol. 75), (pp. 289-315). Sage.
- Mankad, A., Gordon, S., & Wallman, K. (2009). Perceptions of emotional climate among injured athletes. *Journal of Clinical Sport Psychology*, 3(1), 1-14.
- Mei-Dan, O., & Langran, M., (2012) Introduction. In Mei-Dan, O., & Carmont, M. (Eds.), *Adventure and extreme sports injuries: epidemiology, treatment, rehabilitation and prevention*. Springer Science & Business Media (p. xi). Springer.
- Miller M. (2010) Extreme sports surfing to success. BBC Business News 2010; Available from: <http://www.bbc.com/news/10130842>.

- Pain, M., & Kerr, J. H. (2004). Extreme risk taker who wants to continue taking part in high risk sports after serious injury. *British journal of sports medicine*, 38(3), 337-339.
- Pain, M. T., & Pain, M. A. (2005). Essay: Risk taking in sport. *The Lancet*, 366, S33.
- Pearson, L., & Jones, G. (1992). Emotional effects of sports injuries: Implications for physiotherapists. *Physiotherapy*, 78(10), 762-770.
- Podlog, L., Dimmock, J., & Miller, J. (2011). A review of return to sport concerns following injury rehabilitation: practitioner strategies for enhancing recovery outcomes. *Physical Therapy in Sport*, 12(1), 36-42.
- Sabesan, V. L. D. J., Lombardo, D. J., Sharma, V., & Valikodath, T. (2015). Hip and knee dislocations in extreme sports: a six-year national epidemiologic study. *J. Exerc. Sports Orthop.*, 2(1), 1-4.
- Sagert, K. B. (2008). *Encyclopedia of extreme sports*, (pp. xvii-xxv). ABC-CLIO. Greenwood Press.
- Sharma, V. K., Rango, J., Connaughton, A. J., Lombardo, D. J., & Sabesan, V. J. (2015). The current state of head and neck injuries in extreme sports. *Orthopaedic journal of sports medicine*, 3(1), 2325967114564358.
- Smith, A. M., Scott, S. G., & Wiese, D. M. (1990). The psychological effects of sports injuries coping. *Sports Medicine*, 9(6), 352-369.
- Sutherland, A. I. (2006). Personal Views: Why are so many people dying on Everest? *BMJ: British Medical Journal*, 333(7565), 452.
- Reese, L. M. S., Pittsinger, R., & Yang, J. (2012). Effectiveness of psychological intervention following sport injury. *Journal of Sport and Health Science*, 1(2), 71-79.
- Rintala, M. A., Elliot, M., DeClerk, B. J., Rairdon, C., Bridgham, C. W., (2007) Extreme sport and the extreme athlete. In Hyde, T. E., & Gengenbach, M.S. (Eds.), *Conservative Management of Sports Injuries* (p. 971). Jones & Bartlett Learning.

Taylor, J., & Taylor, S. (1997). *Psychological approaches to sports injury rehabilitation*.

Lippincott Williams & Wilkins.

Tracey, J. (2003). The emotional response to the injury and rehabilitation process. *Journal of applied sport psychology*, 15(4), 279-293.

Wagman, D., & Khelifa, M. (1996). Psychological issues in sport injury rehabilitation: current knowledge and practice. *Journal of Athletic Training*, 31(3), 257.

Walker, N., Thatcher, J., & Lavallee, D. (2007). Review: psychological responses to injury in competitive sport: a critical review. *The journal of the Royal Society for the Promotion of Health*, 127(4), 174-180.

Warshaw, M. (2000). *Maverick's: The Story of Big-Wave Surfing*: Chronicle Books.

Weaver, M. (2009). Kayak record: Down the creek with a broken paddle. *Gaurdian: News Blog*.

Wiese-Bjornstal, D. M., Smith, A. M., Shaffer, S. M., & Morrey, M. A. (1998). An integrated model of response to sport injury: Psychological and sociological dynamics. *Journal of applied sport psychology*, 10(1), 46-69.

Wiese, D. M., Weiss, M. R., & Yukelson, D. P. (1991). Sport psychology in the training room: a survey of athletic trainers. *The Sport Psychologist*, 5(1), 15-24.

Willig, C. (2008). A Phenomenological Investigation of the Experience of Taking Part in Extreme Sports'. *Journal of Health Psychology*, 13(5), 690-702.

Young, C. C. (2002). Extreme sports: injuries and medical coverage. *Current sports medicine reports*, 1(5), 306-311.

APPENDICES

Appendix A – Interview Guide

The participant was firstly thanked for taking part in the study. The objectives of the study were outlined and explained clearly. It was stated that the participants could discontinue the interview at any point. It was also conveyed that their data would be used for research purposes only. The participants had all given verbal or written agreement to participate and to be audio-recorded and were informed of the general research topics in question. Interview questions acted as a guide however the interview was conducted in an open manner to allow for personal stories and examples to enrich the data and to make the athletes feel at ease.

Perceived Severity of Physical Injury

1. What type of injuries have you experienced in your sport?
2. Have your injuries caused other physical symptoms?
3. How would you rate the severity of your injuries?
4. Have you needed to seek treatment / medical attention for your injuries?
How would you describe your recovery?
5. Did your injuries affect any competitions or your subsequent level of performance or participation?

Perceived Severity of Psychological Trauma

6. Could you describe some of the emotions you experienced?
7. How did your degree of activity restriction affect you?
8. How would you rate the seriousness of the psychological strain you experienced?
9. Did this affect any competitions or your subsequent level of performance?
10. Did this distress consequently prevent you from taking part in sport?

Coping

11. What have been the biggest challenges, physical factors, psychological factors or both?
12. What elements helped you deal with the aftermath of this?
13. Did you use any techniques to deal with what you went through?
14. Did cultural factors e.g. your mentality or outlook on life influence how you coped?
15. What advice would you offer others in the same situation in terms of coping?
16. Finally, do you have any last thoughts or comments on anything not already covered?

The participants were again thanked for their participation and were reminded that if they had any questions at a later stage, they had the researchers contact details. It was stated that when the data would be transcribed, a copy would be sent to them to verify all information given. It was reiterated that in the coming months, they would receive mental skills that may help with re-current or chronic injuries or negative emotions related to sport that they may face in the future.

Appendix B – Briefing Statement



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Department of Sport Science & Physical Education

Briefing Statement

What is the study about?

We invite you to participate in a research study investigating extreme sports injury; psychological effects & coping. The goal of this research is to examine how extreme sports injuries are interconnected to the psychological condition. Mental coping strategies actively utilised by extreme sport athletes will be determined. To add an applied element to this research, based on the researcher's knowledge and experience, follow-up documents of suggested mental skills tailored to each participant will be presented based on the interview data. This study is being conducted as part of the European Masters in Sport & Exercise Psychology at the School of Physical Education and Sport Science, University of Thessaly, Trikala, Greece.

What would I be required to do?

You will be asked to complete a short interview with a researcher which contains approximately 15 questions that we anticipate will take approximately 30 minutes to complete.

Contact Details

Researcher:

Nollaig Ni Chárthaigh nollaignc4@gmail.com Telephone: (+30)697194821

Supervisors:

Charis Kouthouris: kouthouris@pe.uth.gr

Marios Goudas: mgoudas@pe.uth.gr

Yannis Theodorakis: theodorakis@pe.uth.gr

Appendix C – Debriefing Statement



UNIVERSITY OF
THESSALY

Department of Sport Science & Physical Education

Debriefing Statement

This study you have just completed was designed to explore injury, psychological effects and coping in extreme sports. Topics such as symptoms of injury, severity of injury, rehabilitation, trauma experienced, impact on performance, major challenges and coping strategies allowed the researcher to gain an important insight into this phenomenon.

By participating in this study, you have first-hand knowledge of what it is like to be a part of psychological research. Your participation is not only greatly appreciated by the researchers involved, but the data collected could possibly aid athletes, coaches and healthcare professionals involved in the realm of sports and exercise.

Thank you.

Contact Details

Researcher:

Nollaig Ni Chárthaigh nollaignc4@gmail.com Telephone: (+03)6971948219

Supervisors:

Charis Kouthouris: kouthouris@pe.uth.gr

Marios Goudas: mgoudas@pe.uth.gr

Yannis Theodorakis: theodorakis@pe.uth.gr

