2018

Motivators and Dependency within Natural and Virtual Sensation Seekers

Selvey, Christopher Dallas

http://hdl.handle.net/10026.1/11952

http://dx.doi.org/10.24382/769

University of Plymouth

All content in PEARL is protected by copyright law. Author manuscripts are made available in accordance with publisher policies. Please cite only the published version using the details provided on the item record or document. In the absence of an open licence (e.g. Creative Commons), permissions for further reuse of content should be sought from the publisher or author.
This copy of the thesis has been supplied on condition that anyone who consults it is understood to recognise that its copyright rests with its author and that no quotation from the thesis and no information derived from it may be published without the author’s prior consent.
MOTIVATORS AND DEPENDENCY WITHIN NATURAL AND VIRTUAL SENSATION SEEKERS

by

CHRISTOPHER DALLAS SELVEY

A thesis submitted to Plymouth University
in partial fulfilment for the degree of

ResM Biological Sciences

Duchy node of School of Biological & Marine Sciences

September 2017
Acknowledgements

I would like to sincerely thank my Director of Study and friend Peter McGregor for guiding me through this research with invaluable advice and belief in my ability. I would also like to thank members of the Cornwall College Team, especially Ruth Martin and Angus Jackson, for their support and advice and Lawrence Moores, for generously allowing me time to progress with the research and write-up.

I would also like to thank Cornwall College and the European Social Fund for their funding contributions which enabled me to undertake this research and for British University College Sports (BUCS), Surf Science and Technology (SST) and Insomnia for allowing me access to participants.

I would also like to thank Peter and Valarie Martin for reading the thesis and for their feedback.

Finally I would like to give huge thanks to my wife for enabling me the time and the space necessary to complete this thesis and thanks to my children for making me smile.
Author’s Declaration

At no time during the registration for the degree of Research Masters in Biological Sciences has the author been registered for any other University award without prior agreement of the Graduate Sub-Committee.

Work submitted for this research degree at the Plymouth University has not formed part of any other degree either at Plymouth University or at another establishment.

This study was financed with the aid of a studentship from the European Social Fund and Cornwall College.

Relevant scientific seminars were attended at which work was presented.

Presentation Seminars attended:
Cornwall College Newquay Research and Scholarship day May 2015
Cornwall College Newquay Research and Scholarship day May 2016
Cornwall College Newquay Research and Scholarship day May 2017

Word count of main body of thesis: 12,305

Signed_____________________________________________

Date____________________________________

______________________________________________
Motivators and Dependency within Natural and Virtual Sensation Seekers  
Christopher Dallas Selvey

Abstract

Inactivity and its negative implications on health, well-being and quality of life are a global issue with around 40% of adults in the UK not meeting physical activity guidelines currently sat out by the government. Modern sedentary lifestyle behaviours, such as excessive Internet and video game participation, are contributing factors to this issue. With the rise of households having accessibility to high speed connectivity and devices with the ability to access the Internet and play video games these behaviours are likely to increase. Motivation, Addiction and Sensation Seeking were measured in gamers and surfers using a self-report questionnaire survey. It was thought that both gamers and surfers would share facets of these psychological aspects although participation in their chosen activities usually require different energy expenditures and take place in contrasting environments. Gamers and surfers do share similarities in eight out of the ten aspects of Motivation, Addiction and Sensation Seeking that were measured and showed significantly higher results in measures of Sensation Seeking and Intrinsic Motivation when compared to wider population norms. These findings suggest that both gamers and surfers, in this study, have similar psychological make ups and both groups could be described as intrinsically motivated sensation seekers who have similar levels of risk of addiction to their chosen activities. Therefore the activity of surfing could potentially be used as an intervention or therapeutic lifestyle change that would fulfil important psychological requirements. This would assist in enhancing the health, through exercise, the well-being, through participation in the outdoors environment and therefore the overall quality of life of individuals participating in a sedentary lifestyle behaviour, such as excessive Internet or video gaming.
# Table of Contents

1. Introduction 11
   1.1 Overview 11
       1.1.1 Exercise, Health and Well-being 11
       1.1.2 Physical Inactivity and Sedentary Lifestyles 13
       1.1.3 The Natural Environment, Quality of Life and Well-being 14
       1.1.4 Implications of this research 15
       1.1.5 Sample descriptors and Physiological elements 17
       1.1.6 Limitations of questionnaires 19
   1.2 Psychological elements of this research 19
       1.2.1 Motivation 19
       1.2.2 Addiction 21
       1.2.3 Sensation Seeking 26
   1.3 Objectives and Hypothesis 29

2. Methodology 30
   2.1 Participants 30
       2.1.1 Surfers 30
       2.1.2 Gamers 31
       2.1.3 General Population 31
   2.2 The Questionnaire Design 32
       2.2.1 Motivation 33
       2.2.2 Addiction 35
       2.2.3 Sensation Seeking 36
   2.3 Analysis 37
   2.4 Demographics 37

3. Results 38
   3.1 Sensation Seeking 39
   3.2 Motivation 40
       3.2.1 Intrinsic Motivation Subscales 41
       3.2.2 Extrinsic Motivation Subscales 42
   3.3 Addiction 43
4. Discussion
   4.1 Motivation
      4.1.1 Intrinsic Motivation
      4.1.2 Extrinsic Motivation
   4.2 Sensation Seeking
   4.3 Addiction
5. Implications of this study
6. Conclusions
7. Appendices
   7.1 Normality and Homogeneity of Variance tests
      7.1.1 Exercise Addiction Inventory
      7.1.2 Sensation Seeking Scale
      7.1.3 Intrinsic Motivation – Accomplish subscale
      7.1.4 Intrinsic Motivation – Know subscale
      7.1.5 Intrinsic Motivation – Stimulation subscale
      7.1.6 Total Intrinsic Motivation
      7.1.7 Extrinsic Motivation – Externally Regulated subscale
      7.1.8 Extrinsic Motivation – Identified Regulated subscale
      7.1.9 Extrinsic Motivation – Introjected Regulate subscale
      7.1.10 Total Extrinsic Motivation
   7.2 Demographic data
      7.2.1 Gender differences of Gamers and Surfers
      7.2.2 Age ranges of Gamers and Surfers
      7.2.3 Experience ranges of Gamers and Surfers
      7.2.4 Participation frequency of Gamers and Surfers
      7.2.5 Participation frequency of Gamers in physical activity and Surfers in gaming
8. Reference list
<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Page No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>32</td>
<td>Section of questionnaire used to elicit demographic data</td>
</tr>
<tr>
<td>2.2</td>
<td>34</td>
<td>Section of questionnaire used to elicit Motivation data</td>
</tr>
<tr>
<td>2.3</td>
<td>35</td>
<td>Section of questionnaire used to elicit Addiction data</td>
</tr>
<tr>
<td>2.4</td>
<td>36</td>
<td>Section of questionnaire used to elicit Sensation Seeking data</td>
</tr>
<tr>
<td>3.1</td>
<td>39</td>
<td>Graph displaying the mean Sensation Seeking scores for Gamers and Surfers and General Population</td>
</tr>
<tr>
<td>3.2</td>
<td>40</td>
<td>Graph displaying the mean scores for Total Extrinsic and Intrinsic Motivation for Gamers and Surfers</td>
</tr>
<tr>
<td>3.3</td>
<td>41</td>
<td>Graph displaying the mean scores for the Intrinsic Motivation Subscales for Gamers, Surfers and General Population</td>
</tr>
<tr>
<td>3.4</td>
<td>42</td>
<td>Graph displaying the mean scores for the Extrinsic Motivation Subscales for Gamers, Surfers and General Population</td>
</tr>
<tr>
<td>3.5</td>
<td>43</td>
<td>Graph displaying the mean scores for Addiction for Gamers and Surfers</td>
</tr>
<tr>
<td>3.6</td>
<td>44</td>
<td>Graph displaying the levels of Addiction in Gamers and Surfers</td>
</tr>
<tr>
<td>7.1</td>
<td>64</td>
<td>Normality plot of Exercise Addiction Inventory scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.2</td>
<td>65</td>
<td>Normality plot of ImpSS scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.3</td>
<td>66</td>
<td>Normality plot of Intrinsic Motivation – Accomplish subscale scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.4</td>
<td>67</td>
<td>Normality plot of Intrinsic Motivation – Know subscale scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.5</td>
<td>68</td>
<td>Normality plot of Intrinsic Motivation – Stimulation subscale scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.6</td>
<td>69</td>
<td>Normality plot of Total Intrinsic Motivation for Gamers and Surfers</td>
</tr>
<tr>
<td>7.7</td>
<td>70</td>
<td>Normality plot of Extrinsic Motivation – Externally regulated subscale scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.8</td>
<td>71</td>
<td>Normality plot of Extrinsic Motivation – Identified regulated subscale scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.9</td>
<td>72</td>
<td>Normality plot of Extrinsic Motivation – Introjected regulated subscale scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.10</td>
<td>73</td>
<td>Normality plot of Total Extrinsic motivation scores for Gamers and Surfers</td>
</tr>
<tr>
<td>7.11</td>
<td>74</td>
<td>Gender differences of Gamers and Surfers</td>
</tr>
</tbody>
</table>
7.12 Age ranges of Gamers  
7.13 Age ranges of Surfers  
7.14 Experience of Gamers  
7.15 Experience of Surfers  
7.16 Participation frequency of Gamers and Surfers in their chosen activities  
7.17 Participation frequency of Gamers in physical activity and Surfers in gaming

List of Tables

<table>
<thead>
<tr>
<th>Table No.</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Intrinsic and Extrinsic Motivation Subscales from the Sports Motivation Scale</td>
<td>33</td>
</tr>
<tr>
<td>3.1 Statistical differences between Surfers and Gamers and between these two groups and General Population</td>
<td>38</td>
</tr>
<tr>
<td>4.1 Mean Intrinsic Motivation Subscale scores for Gamers and Surfers compared to gender differences in General Population</td>
<td>51</td>
</tr>
<tr>
<td>4.2 Mean Total Intrinsic and Total Extrinsic Motivation score for Gamers and Surfers compared to surfers and golfers</td>
<td>52</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 Overview

This thesis will explore the possibility of using a physical activity as a therapeutic intervention or lifestyle change for a problematic sedentary lifestyle or excessive inactivity that has the potential to negatively affect an individual’s Quality of Life (QoL). The health benefits of exercise and the issues with physical inactivity are introduced in the subsections below along with the implications of this research in relation to this thesis. Psychological aspects, which are reviewed in the subsections below, of individuals participating in a specific physical activity and individuals participating in a potential excessive inactivity will be measured and compared between each other and samples from a general population (GP). This report will explore whether individuals participating in a physical activity share similarities in psychology with individuals participating in a potentially excessive inactivity and if these differ from a GP. If this is evident then there is a potential to suggest the replacement of an excessive inactivity with that of a specific physical activity as a ‘therapeutic lifestyle change’ that will fulfil aspects of personality and possibly enhance an individual’s QoL.

1.1.1 Exercise, Health and Well-being

The psychological and biological benefits of physical exercise and its positive effects on QoL are generally well known and are recognised nationally by medical organisations such as the National Health Service (NHS) and globally by the World Health Organisation (WHO). Some of these benefits to health include mood enhancement (Anderson and Brice, 2011), maintenance of a healthy Body Mass Index (BMI; CDC, 2015b) and a reduction in associated
injuries of an unhealthy BMI, such as falls (Janney and Jakicic, 2010), a reduction in anxiety and depression (De Moor et al., 2006), a reduced chance of Type II diabetes, cardiovascular disease, dementia and some cancers (Reed and Ones, 2006; CDC, 2015b; NHS, 2015a; Keadle et al., 2017; WHO, 2017). The positive relationship between physical activity and mental health has also been identified and has led to the inclusion of exercise and physical activity as a treatment for mental health patients (Crone and Guy, 2008). Sufferers of Severe and Major Depressive Order (Mota-Pereira et al., 2011; Schuch et al., 2011), and chronic diseases (Pedersen and Saltin, 2006) have all responded positively to exercise as a treatment. The mood enhancement of mental health patients participating in physical activity has been reported (Rocheleau et al., 2004) with negative moods such as anxiety and depression being typically decreased and positive moods such as feelings of vigour and happiness increasing following exercise (Reed and Ones, 2006). It is generally agreed that regular bouts of exercise or physical activity can have a positive effect on an individual's general health, well-being and overall QoL (Stubbe et al., 2007).

Currently the UK Chief Medical Officer’s Guidelines (NHS, 2015b) advise that adults between the ages of 19 and 64 should aim to achieve at least 150 minutes of moderate intensity, or 75 minutes of vigorous intensity exercise weekly (Townsend et al., 2015). Moderate intensity exercise is defined by fitness experts as activity that burns three to six times the energy it takes to sit quietly (Harvard School of Public Health, no date) or induces 50 to 70% of an individual’s maximum heart rate (MHR; CDC, 2015a). Vigorous exercise is classified as an excess of six times the energy taken to sit quietly (Harvard School of Public Health, no date) or which induces 70 to 85% MHR (CDC, 2015a). Current statistics suggest that around 30 to 40% (20 million) of adults in
the U.K. are not meeting these guidelines (Townsend et al., 2015; BHF, 2017) and this figure could be as high as 70% in the USA (200 million; CDC, 2008).

1.1.2 Physical Inactivity and Sedentary Lifestyles

Physical inactivity is a harmful behaviour that is currently recognised as a global pandemic (Ding et al., 2016). Sedentary lifestyles are apparent with around 40% of adults residing in the UK (British Heart Foundation, 2017) not meeting the physical activity recommendations (section 1.1.1) set out by government (NHS, 2015b). Western populations spend around 8.5 hours per day being sedentary and there needs to be a focus on novel ways to decrease sedentary time and increase time spent being active (Keadle et al., 2017). Examples of sedentary behaviours can include long transport journeys, employment in an office environment or more modern examples of sedentary behaviour such as extended times spent watching television or playing video games (Pasch et al., 2009; Lou, 2014). Reports state that globally, physical inactivity is the fourth leading cause of premature death resulting from coronary heart disease, strokes, specific cancers and Type II diabetes (British Heart Foundation, 2013; BHF, 2017). Physical inactivity has a direct economic burden (Ding et al., 2016) with estimates of annual costs of around £1.2 billion to UK healthcare services (BHF, 2017) and around £35 billion to global healthcare services (British Heart Foundation, 2017). Six percent (UK = 10.5%) of these costs are directly related to coronary heart disease, 10% (UK = ~ 18%) to both colon and breast cancer respectively and 7% (UK = 13%) to Type II diabetes with other cardiovascular diseases, falls and the associated injuries and obesity adding to these costs (British Heart Foundation, 2013).
1.1.3 The Natural Environment, Quality of Life and Well-being.

The natural environment, whether a green space, such as a field or park (Huynh et al., 2013), or a blue space, such as the ocean or a lake (Depledge and Bird, 2009), can provide a setting for physical activity and many activities rely on the natural environment to be practiced. There is mounting evidence regarding the additional benefits of participation in physical activity within a natural environment (Cook, 2015; Maxwell and Lovell, 2016; White et al., 2016; Bragg and Leck, 2017). These additional benefits are usually related to well-being and the ‘restorative’ effects of the natural environment (Ulrich, 1983; Kaplan and Kaplan, 2011; Rosenberg et al., 2014).

Other research has specifically concentrated on the effect of participation in activities within the ocean or coastal environment, which is occasionally referred to as the ‘blue gym’ (Depledge and Bird, 2009; Caddick, Smith and Phoenix, 2015; White et al., 2016), and more pertinent to this study, to the specific activity of surfing. Surf specific programmes focussing on psychosocial development for disabled and autistic children have been developed and utilised with positive outcomes (Apel, 2013). Observations during these qualitative studies showed the positive outcomes exhibited to include improved self-confidence and social development. Male combat veterans aged between 27 and 60 with posttraumatic stress disorder (PTSD) who followed twice weekly surfing, yoga and meditation classes enjoyed a ‘respite’ from the damaging symptoms of their PTSD symptoms (Caddick, Smith and Phoenix, 2015) again evidencing positive effects of surfing and the ocean environment. The psychological effects of a short surfing session have also been investigated and a single 30 minute bout of surfing induced a significant increase in positive ‘affect’ and a significant decrease in negative ‘affect’ (Pittsinger, 2009).
Therefore a variety of durations of surfing experiences have been shown to have positive effects on a variety of ages and health issues.

Entering the ocean environment does not come without its own risks. Exposure to zoonosis, pathogens, wildlife and pollutants (White et al., 2016) or impact injuries with water craft or local topography (Meir, Gilleard and Coutts, 2011; Nathanson, 2012) and of course drowning are all risks that need to be assessed before any activity in this environment.

So although the positive benefits of the ocean and coastal environment are evident and can be delivered via short term interaction (Pittsinger, 2009) or longer duration programmes (Caddick, Smith and Phoenix, 2015) more research is needed to fully understand these benefits (White et al., 2016) and their potential use as an enhancement of health, well-being and QoL.

1.1.4 Implications of this research

Research has been published that addresses ‘therapeutic lifestyle changes’ as potential treatments for psychopathologies, reduced well-being (Rohrer, Rush Pierce and Blackburn, 2005; Schuch et al., 2011) and chronic diseases (Pedersen and Saltin, 2006). As already discussed (section 1.1.3), specific surfing programmes have already been utilised as therapeutic interventions and positive outcomes have been reported after short periods of these ‘surfing’ specific activities within the ocean environment. These reports range from ‘one off’ interventions (Apel, 2013) aimed at increasing activity and well-being in adolescent mental health sufferers, short term eight week programmes aimed at developing specific ‘surfing’ skills with the aim of reaching a standing ‘wave riding’ ability (Clapham et al., 2014) to longer term, 12 to 18 month observations of combat veterans who use surfing and the natural environment as an
intervention to PTSD (Caddick, Smith and Phoenix, 2015). Caddick, Smith and Phoenix (2015) do not directly refer to their work with PTSD sufferers as a therapeutic lifestyle change, but the positive observations in relation to well-being were recorded over a long duration programme. They also believe that surfing might need to be practised regularly to develop and maintain well-being (Caddick, Smith and Phoenix, 2015). So this thesis believes that their report is the closest to associating surf specific activities as a potential beneficial therapeutic lifestyle change.

Published research has not been found that uses psychological or personality aspects of sports participants as a specifier for intervention. Nor which addresses a therapeutic lifestyle change for individuals suffering from a personal or socially harmful behaviour that have shared psychological aspects with specific sports participants. Prescribing specific sports or activities that fulfil important psychological needs and address an individual’s specific diagnoses could be potentially important in maximising the effectiveness of an intervention.

The concept of offering exercise on prescription has been put into practise in America where a physician regularly prescribes exercise to her patients. One patient was prescribed a 45 minute session of walking or running in a local park, four times per week. The park was specifically chosen over a ‘gym’ to include the benefits of the natural environment (Bauers, 2015).

The research in this thesis compares aspects of psychology between sports participants (Surfers) and individuals who could potentially be at risk of excessive inactivity (Gamers) and also compares their aspects of psychology to a wider population. A similarity in psychological aspects of gamers and surfers could imply that using psychological markers specific sports or activities could
be prescribed or utilised as an intervention or ‘therapeutic lifestyle change’. These would be psychologically tailored to meet specific psychological requirements of the ‘sufferer’ and therefore potentially enhance their health, well-being and overall QoL.

1.1.5 Sample descriptors and Psychological elements

The sports participant sample will consist solely of ‘surfers’ and the individuals with a potential personal harmful behaviour will consist solely of ‘gamers’. For the purpose of this thesis, hereinafter, ‘Gamers’ and ‘Surfers’ refer to the sample used in this research and un-italicised references are generic. Surfers in this study are defined as individuals who are self-reporting ‘stand up’ surfers and Gamers are also self-reporting users of undisclosed formats of video or internet/online based games. Gamers and surfers respective activities are usually undertaken in contrasting environments and have differing fitness requirements for participation and differing associated risks. Often gaming does not require large energy reserves (Lyons et al., 2012) and can lead to extended periods of inactivity whereas surfing can be a physically demanding activity (ESPN, no date) which can maintain a heart rate between 65 to 85% MHR (Shane, 2014). A 75 minute surfing session not only meets government guidelines on weekly physical activity requirements (Meir, Gillear and Coutts, 2011) but also participants enjoy the additional benefits of physical exercise in a natural environment. Surfing does not come risk free as individuals surfing are not only exposing themselves to the risks associated with the ocean environment (section 1.1.3) but also the added risks of the activity itself. The majority of injuries associated with surfing are minor acute injuries associated with impact, such as contusions or lacerations (Meir, Gillear and Coutts, 2011; Nathanson, 2012), with very few surfers experiencing long term reductions in
health or physical ability. Ninety six percent of surfers claim that surfing is an important contribution to their health and well-being (Meir, Gilleard and Coutts, 2011) and therefore the benefits would seem to far outweigh the associated risks. Gamers do not escape risk of physical injury with minor acute injuries, such as tendonitis and palmer ulceration, being commonly associated with excessive gaming (Jalink et al., 2014). Gaming is not harmful per se as ‘healthy excessive enthusiasms add to life whereas addictions take from it’ (Griffiths, 2005) and positive outcomes of gaming, such as problem solving skills and inter group relations have been reported (Adachi and Willoughby, 2017). Yet any activity that has a potential for addiction (Zastrow, 2017), is practised excessively and is sedentary by nature can induce problematic behaviours (Spekman et al., 2013) and have associated health issues (BHF, 2017). Where excessive gaming and internet use is concerned, researchers have recognised these problematic behaviours and termed them as ‘Internet Gaming Disorder’ (IGD; King and Delfabbro, 2014; Kaptis et al., 2016; Zastrow, 2017) or ‘Gaming Addiction’ (Kuss, 2013) and these are discussed further below (section 1.2.2).

Surfing is referred to as a lifestyle sport (ucsdkipher, 2014) with the same potential as other extreme sports for the participant to display the negative effects of addiction and craving (Buckley, 2016), but it is not sedentary by nature (Shane, 2014) and takes place in the natural environment.

Literature suggests that both gamers and surfers could have similar sensation seeking personality traits (Diehm and Armatas, 2004; Mehroof and Griffiths, 2010; Hu et al., 2017) fulfilled by the participation in activities that deliver intense sensations and experiences (Zuckerman, 1994). It has also been suggested that surfers possess specific intrinsic motivational drivers (Diehm
and Armatas, 2004) for participation in their chosen activity, yet these motives have not been explored for gamers. Therefore the three areas of psychology that this thesis will compare between gamers and surfers, and which are further described in the subsections below, are Motivation, Personality (specifically sensation seeking) and Addiction.

1.1.6 Limitations of questionnaires

Data for analysis will be collected via self-reporting questionnaires and although relatively cheap and easy to produce and distribute they do have their limitations. Social desirability bias can occur when a participant fabricates their answer so an unfavourable behaviour is not reported, or to make themselves look better (Kaminska and Foulsham, 2013) resulting in inaccurate responses. A random approach to distribution as well as anonymous, self-completion should help to reduce SDB (PsycholoGenie, 2017) in this research.

1.2 Psychological elements of this research

1.2.1 Motivation

Motivation is the process that drives desires, impulses, goals and behaviours (Cherry, 2016; Sparknotes, 2017) and this process involves elements of an individual’s biology and psychology (Deci and Ryan, 1985) as well as being influenced by social cues (Tenenbaum and Eklund, 2007). Not only do individuals have different amounts of motivation they can also have different types of motivation and these amounts and types can vary between activities (Deci and Ryan, 2000). Motivational theories are explained in the development of Deci and Ryan's (1985) development of ‘Self-Determination Theory’ (SDT)
which is based on the satisfaction of three psychological needs to encourage health and well-being. These needs are ‘competence’; the desire to be able to control the outcome and develop mastery, ‘relatedness’; the desire to interact and be connected to others and ‘autonomy’; the desire to be in complete control of your own life (Deci and Ryan, 1985; Pelletier et al., 2013). The importance of this theory has been recognised in an educational context (Vallerand et al., 1992) but they have equal relevance in sporting contexts where knowledge, achievement, stimulation, praise and reward (Baena-Extremera et al., 2014) are all important aspects of improvement and mastery. Motivation in sports psychology is not a new concept and it is agreed that there are two main motivational drivers (Deci and Ryan, 1985; Vallerand et al., 1992; Pelletier et al., 1995). The first are via external forces, such as material rewards or praise from a coach and is referred to as extrinsic motivation; the second is internally driven, usually through excitement, fun or stimulation derived from the activity itself and is referred to as intrinsic motivation (Pelletier et al., 1995). The recognition and importance of Deci and Ryan’s motivational theories has led to the development of tools to measure an individual’s motives in a sporting or exercise context. Examples of these tools are the ‘Sports Motivation Scale’ (SMS; Pelletier et al., 1995) the Behavioural Regulation in Sport Questionnaire (BRSQ; Lonsdale, Hodge and Rose, 2008) the Exercise Motivation Scale (EMS; Li, 1999) and the Exercise Motivation Inventory (EMI; Molanorouzi, Khoo and Morris, 2014). These questionnaires measure aspects of extrinsic motivation, intrinsic motivation, amotivation and their constructs set out in SDT. The SMS was designed by Pelletier et al (1995) to measure intrinsic motivation, extrinsic motivation and amotivation across a wide range of recreational and competitive sporting disciplines (Webber, 2002) yet it has not entirely escaped criticism. It
was suggested by Mallett et al. (2007) that the SMS had failed to include ‘integrated regulation’, an element of extrinsic motivation recognised in SDT (Mallett et al., 2007). This has recently been accepted by the developers of the SMS and thus the scale has been revised and the SMS-II developed to include the ‘integrated regulation’ construct (Pelletier et al., 2013). The SMS has been widely validated through research into adolescent athletes (Baena-Extremera et al., 2014), college students (Webber, 2002) and senior athletes (Shaw, Ostrow and Beckstead, 2005). This versatility and the validity of the SMS, whilst taking into consideration the infancy of the SMS-II, are reasons for its use in this research but also pertinent to this study is that the SMS has been used to measure motivation in a sample of surfers recruited through an Australian surf club (Diehm and Armatas, 2004). This comparative study found that surfers scored significantly higher than golfers in intrinsic motivation and confirms the use of the SMS as the measurement tool for this study to assess the motives of Gamers and Surfers to their respective activities. In its purest form motivation can be classified as being driven intrinsically or extrinsically and although the subscales of intrinsic and extrinsic motivation will be measured, there will be emphasis on total intrinsic and extrinsic measures to potentially alleviate previous issues with the SMS subscales.

1.2.2 Addiction

Addiction is when an individual’s excessive use of a substance or participation in an activity results in physiological symptoms, such as tolerance and withdrawal and/or psychological symptoms, such as anxiety and depression (Hausenblas and Symons Downs, 2002). These symptoms in turn can then lead to social, work and family conflicts (Griffiths, Szabo and Terry, 2005) and affect the individual’s QoL. Addiction and dependency are usually associated with
substance abuse such as drugs, alcohol or nicotine (Zastrow, 2017) but more recent research has linked addiction to activities such as eating, gambling, sex, exercise and video gaming and the internet (Griffiths et al., 2015). These non-substance addictions are known as ‘behavioural’ addictions and the negative effects on a sufferer’s health, well-being and QoL have been recognised alongside the more familiar substance addictions (Potenza, 2015). Individuals who participate in substance abuse (Bardo et al., 2007) and risky behaviours, such as gambling (Donati, Chiesi and Primi, 2013), promiscuous sex (Donohew et al., 2000; McCoul and Haslam, 2001; Charnigo et al., 2013) and high risk sports (Diehm and Armatas, 2004), have often been linked with having a ‘sensation seeking’ personality trait which is further discussed in the following section. The reduction in QoL and the social implications of substance and behavioural addictions are well documented. Excessive video gaming and internet use have been specifically linked to the onset of mental health problems such as attention-deficit/hyperactivity disorder (ADHD) and obsessive-compulsive disorder (Kuss and Griffiths, 2012), as well as the previously discussed issues related to extended periods of physical inactivity (section 1.1.2).

With more people having high speed connectivity to the internet (Prescott, 2016) and 65% of US households owning devices with the ability to play video games (Lofgren, 2017), the popularity of online gaming is increasing (Prescott, 2016). This increase can also be represented by an expected revenue increase of 4.8% from 2015 to 2020 in the global gaming industry (Takahashi, 2016) and could result in more individuals being at risk of excessive usage (Prescott, 2016; Hu et al., 2017). There is mounting evidence that excessive gaming and internet use can be the cause of psychological problems (Kuss, 2013; Griffiths
et al., 2016; Kaptsis et al., 2016; Griffiths and Nuyens, 2017) with similar symptoms of addiction to substance abuse (Spekman et al., 2013). Sociological problems, such as social and psychological withdrawal, are also evident in excessive gamers (Young, 2009; Kuss, 2013) as are the health issues associated with inactivity.

Terms such as ‘Internet Gaming Disorder’ (IGD) and ‘Gaming Addiction’ (GA) are accepted by some researchers and appear in the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-5; Kuss, 2013). However the same terms were also debated at the last WHO International Classification of Diseases (ICD-10) and were not included due to issues with terminology and definition of the diagnostic criteria but will be debated again in the WHO’s ICD-11 in 2018 (Zastrow, 2017). Some of the issues included suggestions that the research base was low and had inconsistencies, controversies and confusions and that the size of the problem was unclear (Aarseth et al., 2016). This suggests a collaboration of experts would be beneficial to resolve inconsistencies within research methods that surround behavioural addictions and to encourage a bank of comparable and consistent research to clarify GA/IGD. The debate on legitimacy of GA/IGD currently exists without resolution (Aarseth et al., 2016), and therefore some believe that this could result in a potential waste of public resources (Aarseth et al., 2016; Ferguson in Zastrow, 2017), if GA/IGD becomes a diagnosable addiction this would then be treatable with a cost to the relative health care provider. The focus of others, as well as this thesis, are on the symptomatic evidence of the ‘sufferer’ in the real world (Tam, Koob & Griffiths in Zastrow, 2017) making the debate around IGD/GA irrelevant. If symptoms of addiction, such as withdrawal, tolerance, relapse and salience (Griffiths, Szabo and Terry, 2005) are evident within, diagnosed or perceived by
a sufferer then intervention of these symptoms should be encouraged. Although currently not an officially recognised ‘addiction’ by the WHO, support currently exists for individuals suffering from symptoms of GA/IGD. This support comes in the form of unspecified professional interventions, counselling and alternative therapies (ADT Healthcare, 2017). The issues with GA/IGD are also recognised within the gaming community as support groups and forums exist that are run by recovering sufferers of excessive video game participation (Olganon, no date; CGAA, 2016). This suggests that the symptoms of addiction, in relation to video gaming, are perceived by real world sufferers and interventions or therapeutic life changes could be a way of relieving these.

The benefits of physical activity have already been addressed in this thesis (section 1.1.1) yet concerns also exist regarding compulsive or excessive exercising. The risks of addiction to exercise and sports has been researched with negative symptoms of compulsive or excessive exercise being reported (Griffiths et al., 2015; Lichtenstein and Jensen, 2016) as well as risk of dependence (Hausenblas and Giacobbi, 2004). These concerns have given rise to several measurement tools, such as the Obligatory Exercise Questionnaire (OEQ; Pasman and Thompson, 1988), the Exercise Dependence Questionnaire (EDQ; Ogden, Veale and Summers, 1997) and the Exercise Addiction Inventory (EAI; Terry, Szabo and Griffiths, 2004) which assess the negative effects of excessive exercise such as salience, tolerance, withdrawal and relapse which are further clarified below. The OEQ does not address the symptoms of addiction (e.g. salience, withdrawal, tolerance) but rather an individual’s exercise habits and their feelings towards exercise. The EDS and the EAI both address the physiological and psychological symptoms of
addiction that this thesis is exploring but it is reported that the EDS has internal consistency issues (Hausenblas and Symons Downs, 2002).

Research, using the EAI (Griffiths, Szabo and Terry, 2005) scale for assessment, has reported exercise addiction to range from 3% to 20% of participants in a variety of different sporting activities, including team sports such as football (Mia Beck Lichtenstein et al., 2014), and individual sports such as CrossFit, triathletes and Ironmen (Youngman and Simpson, 2014; Lichtenstein and Jensen, 2016). This research has taken place in a number of different countries (Szabo and Griffiths, 2007; Mónok et al., 2012; M. B. Lichtenstein et al., 2014; Youngman and Simpson, 2014) where there has been issues with interpretation of the scale (Griffiths et al., 2015). The issue seems to be with the top portion of the measurement where a score, on the EAI, of over 24 in some literature refers to ‘at risk of addiction’ (Terry, Szabo and Griffiths, 2004) and in others as ‘at risk of dependence’ (Mónok et al., 2012). Dependence relates to an increase in the addicted activity to elicit the same affect (NIH, 2012) which itself refers to ‘tolerance’, a construct of addiction measured by the EAI. The EAI measures six constructs of addiction which are:

- **Salience**: how important the activity is within an individual’s life and how it dominates their thoughts and feelings.
- **Mood modification**: when an individual experiences a ‘high’ when participating in the activity or a ‘low’ when not and can alter a ‘low’ mood by participating in the activity.
- **Tolerance**: where the individual increase the amount of time participating in the activity to elicit the same ‘high’.
- **Withdrawal symptoms**: when the individual experiences unpleasant feelings when unable to participate in the activity.
- **Conflict**: when conflict occurs between loved ones or social commitments due to the activity.
- **Relapse**: to return to 'addicted' patterns after a period of abstinence.

With tolerance being one of the factors of addiction measured it would seem that Mónok et al.'s (2012) interpretation of 'at risk of dependence' would be sensible and will be used in this research.

No literature could be found that uses a scale of measurement, such as the EAI, to measure the risk of addiction associated with an ‘extreme’ or ‘lifestyle’ sport therefore the findings of this study could provide a comparison to the published figures relating to the published work regarding other exercise and sporting activities.

The EAI has become an important assessment tool in sports addictions (Griffiths et al., 2015) and will be used in this research to measure the risk of addiction to both Gamers and Surfers.

### 1.2.3 Sensation Seeking

Sensation seeking (SS) is a psychological personality trait first identified by Zuckerman through his early research on sensory deprivation (Zuckerman, 1971) and is defined as ‘the seeking of varied, novel, complex and intense sensations and experiences and the willingness to take physical, social, legal and financial risks for the sake of such experiences’ (Zuckerman, 1994). Sensation seeking and risk taking are thought to be related (Roberti, 2004), yet not exclusively, thus evidence of the SS trait has been explored in individuals who participate in a wide range of social, antisocial and sporting activities that
have an element of risk attached. Examples of these are substance and alcohol abuse (Franques et al., 2002; Sargent et al., 2010; Wood, Dawe and Gullo, 2013), promiscuous sex (Donohew et al., 2000; McCoul and Haslam, 2001; Charnigo et al., 2013), risky and aggressive driving (Constantinou et al., 2011), gambling (Donati, Chiesi and Primi, 2013), depression and suicidal behaviour (Ortin et al., 2012), chess (Joireman, Fick and Anderson, 2002), skiing and snowboarding (Ruedl et al., 2012; Thomson and Carlson, 2014), skydiving (Prochniak, 2011), surfing (Diehm and Armatas, 2004) and other high risk sports activities (Freixanet, 1991; Jack and Ronan, 1998). All of these utilise the same self-report questionnaire, known as the Sensation Seeking Scale (SSS; Zuckerman, 1983), to assess and measure constructs of personality. The SSS has gone through several developments focusing on subtle differences regarding the inclusion or positioning of the ‘Impulsivity’ and ‘Sensation Seeking’ aspects of the questionnaire (Zuckerman and Glicksohn, 2016). The third development, which is known as the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ) considered the psychobiological model of personality and considered that the SS trait is combined with the personality trait ‘Impulsivity’ giving rise to a measureable factor unto itself (Zuckerman and Glicksohn, 2016). This factor became an element of the assessment of the ZKPQ known as Impulsivity-Sensation Seeking (ImpSS; Weber, 2001).

The various developments of the SSS have been used since 1983 to indicate the sensation seeking tendencies of individuals who participate in sporting activities (Zuckerman, 1983). Freixanet, (1991) and Jack and Ronan, (1998) both replicated Zuckerman’s (1983) theories of SS and specifically Impulsivity (Imp) personality traits in high physical risk sports by comparing high-risk sports participants and non/low-risk sports participants using the SSS-V. They found
significant positive correlations between SS scores and Imp scores. Interestingly though, both of these studies do not find a significant difference in Imp scores between high and low risk takers. Both of these studies included mountaineers as part of their samples and Woodman et al. (2013) has suggested that those that partake in high risk, long-duration, low-sensation activities, such as mountaineering, are potentially driven by other motivators. This indicates that not all high risk sports are necessarily impulsive. Polish skydivers were profiled by Prochniak (2011) and a significant difference was discovered in ImpSS between the skydivers and a control group. Sensation seeking in skiers and snowboarders has been investigated (Ruedl et al., 2012) and evidence shows that those that self-reported a more risky approach had a higher SS score than those that self-reported a more cautious approach. Surfers have also been profiled by Diehm and Armatas (2004) and they found that surfers scored significantly higher on the SSS-V than golfers.

Sensation seeking has not only been researched in a sporting context but its links to negative, anti-social and unhealthy lifestyle choices have also been explored using Zuckerman’s SSS. Sensation seeking has been found in opioid dependents (Franques et al., 2002) who had significantly higher SS scores to a control group but were comparable to paragliders, another high risk activity. Because of its links with substance abuse, binge drinking, excessive smoking habits (Bardo et al., 2007; Sargent et al., 2010), adolescent gambling (Donati, Chiesi and Primi, 2013) and promiscuous sexual activity (Charnigo et al., 2013) it has been suggested that SS is a worthy assessment and predictor of these high risk, harmful behaviours. Significant associations have also been found between high SS scores and both ‘Serious Suicidal Ideation’ and ‘Suicide Attempts’ (Bardo et al., 2007; Ortin et al., 2012).
These negative, anti-social and unhealthy lifestyle choices have high social costs (Derringer et al., 2010) and a reduced QoL to the ‘sufferer’. The effects on QoL of excessive or compulsive gaming have already been discussed and high SS has been shown to be significantly associated with GA in adolescents (Hu et al., 2017) and with IGD in university students (Mehroof and Griffiths, 2010).

1.3 Objectives and Hypothesis

Gamers and Surfers SS personality traits will be measured using the Impulsivity Sensation Seeking Scale (ImpSS), a component of the Zuckerman Kuhlman Personality Questionnaire (ZKPQ; Zuckerman, 2002), whilst motives for participation in gaming or surfing, along with any risk of addiction, will be assessed using the SMS (Pelletier et al., 1995) and the EAI respectively (Terry, Szabo and Griffiths, 2004). These will be combined to produce one self-reporting questionnaire.

Due to what has been discussed above (Section 1.2) it is thought that Gamers and Surfers will share similar levels of sensation seeking personality and that Gamers will have a higher risk of addiction and dependency to their chosen activity. Although surfers have been shown to have specific intrinsic motives towards surfing (Diehm and Armatas, 2004), the motives of gamers is unclear. It is possible and therefore expected, due to the sensory nature of gaming (Sean, 2012), that participation will be driven by similar intrinsic motives as surfing. It is also expected that the three aspects of psychology measured in Gamers and Surfers, in this research, will differ from values relating to a general population.

Therefore it is hypothesised that Gamers and Surfers will report, via the questionnaire, similar measures of Sensation Seeking, Motivation and
Addiction. A second hypothesis is that both Gamers and Surfers will show differences to a wider population in these three psychological elements.

2 Methodology

2.1 Participants

The subjects for this investigation were Surfers and Gamers.

2.1.1 Surfers

The data regarding Surfers was collected from two sources. First the British Universities and Colleges Sport (BUCS) surf competition and second the 2015/16 cohort of the Surf Science & Technology FdSc, delivered at Cornwall College Newquay, UK.

Data regarding Surfers were collected from the 1st day of the BUCS surf competition held on Friday 16th October, 2015 at Fistral Beach in Newquay, Cornwall. Competing surfers and spectators from universities all over the UK are invited to attend this event, ensuring data would not be biased towards Newquay residents. To further avoid bias a structured sampling technique was employed where every third party of spectators was approached and individuals within that party, irrespective of age (all university students will be over 17) or gender, were invited to complete a questionnaire with the option of ceasing at any time (Sasso et al., 2009). Spectators, who surfed, and competitors were invited to complete the questionnaire allowing for a variety of surfing abilities to make up the sample. 42 questionnaires were completed on this day, 27 male and 15 female.
Students from the FdSc Surf Science & Technology were also invited to complete the same questionnaire, again with the option of ceasing at any time. 11 questionnaires were collected, 10 male and one female.

One of the 53 completed questionnaires gathered was incomplete and therefore discarded. The analyses in this thesis are based on 52 (males = 37, females = 15) complete Surfers questionnaires.

### 2.1.2 Gamers

The data regarding Gamers was collected from the ‘Insomnia 57’ gaming festival held on Friday 25th March, 2016 at the National Event Centre (NEC) in Birmingham, U.K. This event is marketed as ‘The U.K’s Biggest Gaming Festival’ (Insomnia, no date). The same structured sampling technique was employed at this location, where every third party of attendees was approached and individuals within that party, irrespective of gender, were invited to complete the questionnaire with the option of ceasing at any time. Minors were not included within this study so all respondents were over 16 years of age. 55 questionnaires were collected, 48 from male respondents and seven were female. The questionnaires were assessed for suitability. Two questionnaires (one male and one female) were incomplete therefore discarded from analyses. One more questionnaire was excluded at random so that the sample size for each group was balanced. The analyses in this thesis are based on 52 (male = 46, female = 6) complete Gamers questionnaires.

### 2.1.3 General Population (GP)

Data used as a comparison for ‘sensation seeking’ were taken from Goma-i-Freixanet and Ventura's (2008) Spanish study and a comparison for Motivation was taken from Pelletier’s (1995) study. Results in these studies were displayed
as Mean and Standard Deviation composite score values which could be used as a comparison.

2.2 The Questionnaire Design

The questionnaire comprised of 59 items and was designed to be self-reporting to reduce chances of social desirability bias. It was separated into four subsections (Part 1 to 4) to provide clarity during completion. Data were collected on three psychological elements (‘Motivation’, ‘Addiction’ and ‘Sensation Seeking’) and demography (Figure 2.1). Pilot studies showed the questionnaire would normally be completed in less than 10 minutes.

<table>
<thead>
<tr>
<th>A Questionnaire for Surfers: What Motivates a Sensation Seeker?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thank you for agreeing to complete this questionnaire, you’re a legend! It should take you less than 10 minutes to complete. If at any time you decide you don’t want to answer any more questions please feel free to stop.</td>
</tr>
<tr>
<td>Part 1: All about you</td>
</tr>
<tr>
<td>All questionnaires and answers to individual questions will be kept anonymous and no information will be passed onto any 3rd parties.</td>
</tr>
<tr>
<td>1. Are you...</td>
</tr>
<tr>
<td>2. Which age bracket do you fall into?</td>
</tr>
<tr>
<td>3. How many years have you been a ‘surfer’?</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>4. Life commitments allow you to surf...</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>5. What level of surfer would you describe yourself as?</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>6. How often do you play video/computer/online games?</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Figure 2.1. Part 1 of the questionnaire, used to elicit responses on specific demographics from Surfers. The same questionnaire, with “surfer” replaced by “gamer” was used for Gamers.
2.2.1 Motivation

Motives for participation were assessed using the Sports Motivation Scale (SMS; Pelletier et al., 1995). The SMS involves 28 items, each requiring a response on a seven point Likert scale (Likert, 1932; Figure 2.2) and specific questions refer to specific Intrinsic or Extrinsic subscales (Table 2.1). The original 28 items of the SMS refer to an unspecified sporting context therefore minor modifications were made to directly refer questions to the sport of ‘surfing’ or to the activity of ‘gaming’ (e.g. Question 8, Figure 2.2). Composite scores for different subscales were produced by totalling the Likert scale responses from the specified questions in the SMS subsection.

Table 2.1. Intrinsic and Extrinsic subscales that produce composite scores from the Sports Motivation Scale (Pelletier, 1995).

<table>
<thead>
<tr>
<th>Intrinsic</th>
<th>Extrinsic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know</td>
<td>External regulation</td>
</tr>
<tr>
<td>Accomplish</td>
<td>Introjected regulation</td>
</tr>
<tr>
<td>Stimulation</td>
<td>Identified regulation</td>
</tr>
<tr>
<td>Total Intrinsic Motivation (TIM)</td>
<td>Total Extrinsic Motivation (TEM)</td>
</tr>
</tbody>
</table>
Total Intrinsic Motivation scores indicate reasons for participating in the activity due to feelings derived from taking part in it whereas Total Extrinsic Motivation scores indicate reasons for participation that are not directly related to the feelings derived from participation alone (Diehm and Armatas, 2004).

Figure 2.2. Part 2 of the questionnaire. The initial 16 items of the Surfer modified SMS.
2.2.2 Addiction

Addiction and dependency were assessed utilising the Exercise Addiction Inventory (EAI; Terry, Szabo and Griffiths, 2004). The EAI involves six items measured via a five point Likert scale response (Figure 2.3). The original six items of the EAI are directed specifically at exercise, therefore minor modifications were made to directly refer the questions to the sport of ‘surfing’ or to the activity of ‘gaming’. The composite scores of the respondents were used to indicate dependency (below 12) or symptoms of addiction (13 – 23) to their chosen activity or whether the respondent is asymptomatic (above 24).

![Table](image)

Figure 2.3. Section 3 of the questionnaire. The 6 items that comprise the modified EAI for Surfers.
2.2.3 Sensation Seeking

Sensation seeking personality traits were assessed using the Impulsive Sensation Seeking (ImpSS) subsection of the Zuckerman Kulman Personality Questionnaire (ZKPQ; Zuckerman, 2002). The ImpSS subsection of the ZKPQ involves 19 non-sports specific items measured via a compulsory ‘True’ or ‘False’ response (Figure 2.4). A high composite score recognises a desire to engage in thrill seeking experiences or a willingness to take risks for enjoyment (Zuckerman, 2002).

![Figure 2.4. Section 4 of the questionnaire. The initial 14 items of the ImpSS subsection of the ZKPQ.](image-url)
2.3 Analysis

All statistical analysis was completed using R 3.3.1 and R studio (Beckerman and Petchey, 2012; R Core Team, 2013)

The questionnaire data were tested for normality (Shapiro Wilk test results presented in Appendix 7.1) with four out of a total of ten variables representing a significant difference from a normal distribution (Appendix 7.1) and one variable represented a difference in homogeneity of variance (Bartlett tests results presented in Appendix 7.1). Non-parametric inferential statistics were used in all analyses.

2.4 Demographics

All data regarding the demographics of both groups can be viewed in Appendix 7.2.
3 Results

Gamers and Surfers had similar levels of Sensation Seeking, Motivation and Addiction in eight out of ten psychological elements measured (Table 3.1). Surfers had significantly higher sensations seeking (ImpSS) and significantly lower scores for ‘Know’ (Table 3.1). Compared with the GP, both Gamers and Surfers had significantly higher scores in sensation seeking (ImpSS) and subscales of Intrinsic and Extrinsic Motivation (six out of seven and five out of seven, respectively; Table 3.1).

Table 3.1. Relative differences between Surfers & Gamers (Mann Whitney Wilcoxon test) and between these groups and GP (One-sample Wilcoxon signed rank test). Significantly higher results are represented by +, significantly lower by – and no significance by 0. (+) represents differences approaching significance (p = 0.05 – 0.1). N/A represents no test performed. All symbols express the relationship relative to the leading group in the header (e.g. ImpSS: Surfers were significantly higher than Gamers).

<table>
<thead>
<tr>
<th></th>
<th>Surfers vs Gamers</th>
<th>Surfers vs GP</th>
<th>Gamers vs GP</th>
</tr>
</thead>
<tbody>
<tr>
<td>ImpSS</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>TIM</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Accomplish</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Know</td>
<td>_</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Stimulation</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>TEM</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>External reg.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Identified reg.</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Introjected reg.</td>
<td>0</td>
<td>(+)</td>
<td>+</td>
</tr>
<tr>
<td>Addiction</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
The similarities or differences between Gamers, Surfers and the GP in each of the three psychological elements are detailed in the subsections below.

3.1 Sensation Seeking

Surfers had significantly higher ‘Sensation Seeking’ (ImpSS) scores than Gamers (Mann Whitney Wilcoxon test; $W = 925$, $p = 0.009$; Figure 3.1) and the GP had significantly lower scores than both groups (One-sample Wilcoxon signed rank test: Gamers vs GP: $V = 1246$, $p = <<0.0001$; Surfers vs GP: $V = 1375$, $p = <<0.0001$, see also Fig 3.1).

![Figure 3.1](image)

Figure 3.1. Mean (± sd) composite scores for ‘Sensation Seeking’ (ImpSS; see Methods 2.2.3). Gamers (black, $n=52$), Surfers (grey, $n = 52$) and GP (white, $n = 1000$). The threshold line (blue dashed) indicates maximum obtainable ImpSS score.
3.2 Motivation

Gamers and Surfers did not differ for Total Intrinsic Motivation (TIM) and Total Extrinsic Motivation (TEM) composite scores ($W = 1705, p = 0.14; W = 1486, p = 0.45$ respectively; Figure 3.2).

![Graph showing mean composite scores for Extrinsic and Intrinsic motivation for Gamers and Surfers.](image)

Figure 3.2. Mean (± sd) composite scores for Extrinsic (Total Extrinsic Motivation) and Intrinsic (Total Intrinsic Motivation) motivation (see Methods 2.2.1) in Gamers (black) and Surfers (grey). The threshold line (blue dashed) indicates maximum obtainable score.
3.2.1 Intrinsic Motivation Subscales (IMS)

Scores for Gamers and Surfers did not differ for IMS variables ‘Accomplish’ (\(W = 1526, p = 0.26\)) and ‘Stimulation’ (\(W = 1410, p = 0.7\)), whilst Gamers had significantly higher scores than Surfers in the ‘Know’ variable (\(W = 1705, p = 0.023\); Figure 3.3). Both groups had significantly higher IMS scores than the GP (Accomplish: Gamers vs GP, \(V = 1293, p = <<0.001\); Surfers vs GP, \(V = 1262, p = <<0.001\); Know: Gamers vs GP, \(V = 1378, p = <<0.001\); Surfers vs GP, \(V = 1378, p = <<0.001\); Stimulation: Gamers vs GP, \(V = 1377, p = <<0.001\), Surfers vs GP, \(V = 1377, p = <<0.001\); Figure 3.3).

![Intrinsic Motivation Subscales](image)

Figure 3.3. Mean (± sd) composite scores for Intrinsic Motivation Subscales (see Methods 2.2.1) in Gamers (black, \(n = 52\)), Surfers (grey, \(n = 52\)) and GP (white, \(n = 593\)). The threshold line (blue dashed) indicates maximum obtainable score on all subscales.
3.2.2 Extrinsic Motivation Subscales (EMS)

Gamers and Surfers did not differ for any of the three EMS scores (External regulation: $W = 1563, p = 0.7$; Introjected regulation: $W = 1439, p = 0.58$; Identified regulation: $W = 1298, p = 0.73$; Figure 3.4). They also did not differ when compared to the GP in the External Regulation subscale (Gamers vs GP: $V = 787, p = 0.37$; Surfers vs GP: $V = 586, p = 0.35$; Figure 3.4) yet both Gamers and Surfers had a significantly higher Identified Regulation than the GP (Gamers vs GP: $V = 1040, p = 0.0001$; Surfers vs GP: $V = 1091, p = 0.0003$; Figure 3.4). Gamers had a significantly higher Introjected Regulation subscale score than the GP ($V = 956, p = 0.02$) whereas Surfers showed no difference ($V = 883, p = 0.078$; Figure 3.4).

Figure 3.4. Mean ($\pm$ sd) composite scores for Extrinsic Motivation Subscales (see Methods 2.2.1) in Gamers (black), Surfers (grey) and GP (white). The threshold line (blue dashed) indicates maximum obtainable score on all subscales.
3.3 Addiction

Gamers and Surfers did not differ significantly in addiction ($W = 1320, p = 0.84$; Figure 3.5) however, having mean scores falling between 12 – 23, both groups clearly showed symptoms of addiction (Figure 3.5). Surfers had significantly more ‘Dependent’ respondents than did Gamers (Pearsons Chi Squared test: $\chi^2 = 6.72, df = 2, p = 0.035$; Figure 3.6)

Figure 3.5. Mean (± sd) composite scores for the Exercise Addiction Inventory (see Methods 2.2.2) in Gamers (black) and Surfers (grey). The higher threshold line (blue dashed) indicates a score of 23 which specifies respondents were asymptomatic. The lower threshold line (yellow dashed) indicates a score of 12 which specifies respondents were at risk of dependency. Between the threshold lines (a score between 12 and 23) indicates symptoms of addiction.
Figure 3.6. Levels of addiction in Gamers (black) and Surfers (grey).
4 Discussion

Gamers are potentially at risk of minor acute injuries, reduced health, reduced well-being and overall reduction in QoL where there is an addicted and excessive participation in what has been referred to as a sedentary lifestyle (Pasch et al., 2009; Lou, 2014). Surfers are also at risk of minor acute injuries and the negative effects of addiction yet reap the health and well-being benefits of regular physical activity (Hills and Argyle, 1998; De Moor et al., 2006; Stubbe et al., 2007; Anderson and Brice, 2011; CDC, 2015b) undertaken in a natural environment (Depledge and Bird, 2009; Kaplan and Kaplan, 2011; Wheeler et al., 2015). Due to the literature discussed earlier in this thesis (section 1.2) it was hypothesised that gamers and surfers could potentially share similarities in aspects of their personality and psychology due to the similar experiences sensed whilst participating in their respective activities. Gamers and surfers have been shown to have a sensation seeking personality (Diehm and Armatas, 2004; Mehroof and Griffiths, 2010; Hu et al., 2017). Surfers have been shown to possess specific motives for participation (Diehm and Armatas, 2004) yet the motives for gamers could not be found. Although research regarding addiction to lifestyle sports could not be found, Internet and video gaming addiction has been recognised (Rahmani and Lavasani, 2011) as Internet Gaming Disorder (King and Delfabbro, 2014; Kaptis et al., 2016; Zastrow, 2017) or Gaming Addiction (Kuss, 2013). Due to this past research it was thought that Gamers and Surfers could share similarities in the three psychological elements of ‘Personality’, ‘Motivation’ and ‘Addiction’. Eight out of the ten variables within these three psychological elements compared between these two groups did not differ significantly (Table 3.1). There were significant differences between Gamers and Surfers in ‘sensation seeking’ (ImpSS) and in one of the Intrinsic
Motivation (IM) subscales (‘Know’). These findings suggest that Gamers and Surfers share many similarities in the three psychological elements investigated in this research.

It was also important, in relation to the hypotheses set out in this research, to see how these psychological elements of Gamers and Surfers compared to a wider general population (GP) to determine whether they fit or differ from ‘norms’ (Pelletier et al., 1995; Goma-i-Freixanet and Ventura, 2008). It was hypothesised that both groups would evidence differences from these ‘norms’ and Gamers and Surfers did show significant differences in six of the seven variables compared with the GP (Table 3.1). These differences are much greater in ‘sensation seeking’ (Figure 3.1) and the three subscales of IM (Figure 3.3) which is important as this suggests that both Gamers and Surfers share intrinsically motivated sensation seeking personality traits that differ significantly from a wider population. The key findings regarding the psychological similarities between Gamers and Surfers and the significant differences found between the two groups and the GP are highlighted, discussed and evaluated in the subsections below, after which the wider implications related to these findings are discussed.

4.1 Motivation

Motivation is the desire to act on impulses to undertake activities and to have and strive for goals or challenges (Cherry, 2016; Sparknotes, 2017) and if culturally different individuals share the same motivational drives then these different individuals are driven to participate in activities for similar reasons. Previous research has looked specifically at sensation seeking as a motive
(Chirivella and Martínez, 1994), yet there are multiple aspects of motivation, such as intrinsic and extrinsic motivation set out in self-determination theory (Deci and Ryan, 1985), that should also be considered if a complete picture, regarding an individual’s motives, is to be drawn. Similarities were found between Gamers and Surfers in Intrinsic Motivation (IM), Extrinsic Motivation (EM) and the majority of the associated subscales. Gamers and Surfers scores for both Total Extrinsic Motivation (TEM) and Total Intrinsic Motivation (TIM) overlapped extensively (Figure 3.2) as did both groups scores for the EM subscales ‘External Regulation’, ‘Identified Regulation’ and ‘Introjected Regulation’ (Figure 3.4). Similarities in scores were also evident in the IM subscales ‘Accomplish’ and ‘Stimulation’ (Figure 3.3).

It is interesting, in activities that are superficially as different as gaming and surfing, that participants in the respective activities have been found to have similar intrinsic motives for participation. Gaming and surfing, are usually required to take place in contrasting environments due to the required resources. Gaming is usually a low energy, indoor activity that can lead to extended periods of inactivity. This is not exclusively true, especially with the development of mobile devices with internet connectivity and games that use active body movements (Pasch et al., 2009; Lyons et al., 2012). Surfing, in contrast, is usually a physically demanding (ESPN, no date; Meir, Gillear and Coutts, 2011), high energy activity that requires waves, usually oceanic. Again, this is not exclusively true with regards to the progression of artificial wave pools from 2005 (Odriozola and Frisch, 2017) to the present day (Mauro, 2015). Yet both artificial wave pool surfing and oceanic surfing are undertaken in an outdoors, natural, environment and require physical exertion which will elicit a raised heart rate.
The similarities in motivation are key findings in this thesis as they suggest that *Gamers* and *Surfers* share similar motives for participating in very different activities and that demands of these specific psychological elements could potentially be met by one group participating in the opposite activity (e.g. *Surfers* that gamed or *Gamers* that surfed could fulfil psychological requirements).

### 4.1.1 Intrinsic Motivation (IM)

The IM subscale ‘Stimulation’ refers to the drive an individual has to participate in an activity in order to experience sensory pleasure, to have aesthetic experiences or for excitement derived from the activity (Pelletier *et al.*, 1995). Participant’s senses are constantly bombarded with visual, auditory and kinaesthetic information in both gaming (Madigan, 2010) and surfing (Kerr and Houge Mackenzie, 2012) so similarities in this motive could be expected. Both *Gamers* ($\bar{x} = 23.1$) and *Surfers* ($\bar{x} = 22.7$) scored close to the maximum obtainable score (28) on the IM subscale ‘Stimulation’, in fact these scores were the highest scores on all the IM subscales and both were significantly higher than the GP (14.7; Figure 3.3). This suggests that a key motive for both these groups is the ‘stimulation’ of the activity and that gamers acquire that stimulation from a virtual environment whilst usually expending little energy and surfers from a natural environment with high energy expenditure. This desire for stimulation is also supported by the large ‘sensation seeking’ (ImpSS) scores for both groups (Figure 3.1) and which will be discussed later in this thesis (4.2).

The IM subscale ‘Know’ is the only subscale that showed a significant difference between the two groups (Figure 3.3). *Gamers* had a higher ‘Know’ score than *Surfers*. This subscale is concerned with exploration, curiosity and
learning goals (Pelletier et al., 1995) so is better suited to an activity where progression is correlated with these constructs. In gaming it is necessary to ‘explore’, ‘learn goals’ and ‘be curious’ of the virtual environment to progress through a game. This is related to ‘Cognitive Flow’ (Csikszentmihalyi and Nakamura, 2002) and is an important aspect of game design (Sean, 2012). So the finding that Gamers have a higher ‘Know’ IM subscale score than Surfers is reasonable. Surfing does not require exploration and curiosity in the same way, but rather progression is reliant on repetitive practice and training. This can be related to ‘Skill Acquisition’ in sports psychology in which there is a three stage process to excellence within any sporting discipline: the ‘cognitive’ stage, where the participant is introduced to the necessary skillset, very similar to the concepts behind cognitive flow; the ‘associative’ stage, where emphasis is on practice and finally the ‘autonomous’ stage where the biomechanics for sport specific movements are repeated automatically and precisely (Shields, 2015). These constructs, especially the associative stage of skill acquisition, are better suited to the IM subscale ‘Accomplish’ which is concerned with the continued efforts towards mastering difficult techniques (Pelletier et al., 1995). Although Surfers mean score for this subscale was not significantly different from Gamers it was five points higher on the scale and significantly different from the GP (Figure 3.3). Most recreational surfers, of which the majority of this sample was made, would be categorised into the ‘associative’ stage and therefore explains the high ‘Accomplish’ score. Gamers also scored significantly higher than the GP in the ‘Accomplish’ subscale (Figure 3.3).

‘Task orientation’ is another element of the ‘Accomplish’ theory which relates to how tasks can help towards achievement (Pelletier et al., 1995). This theory again fits in with the concept of ‘Cognitive Flow’ (Csikszentmihalyi and
Nakamura, 2002) where continuous actions to achieve manageable tasks and goals, with timely feedback (Sean, 2012), all help to retain focus and eventual accomplishments within the virtual environment.

SMS scores of Gamers and Surfers were compared to those from a GP study (Pelletier et al., 1995). Important similarities have been found between the Gamers and Surfers but there are also key findings that suggest both of these groups are more intrinsically motivated than the GP (Figure 3.3). The three IM subscales, for both Gamers and Surfers were all significantly greater than those published in Pelletier’s (1995) study (Accomplish: Gamers vs GP, V = 1293, p = <<0.001; Surfers vs GP, V = 1262, p = <<0.001; Know: Gamers vs GP, V = 1378, p = <<0.001; Surfers vs GP, V = 1378, p = <<0.001; Stimulation: Gamers vs GP, V = 1377, p = <<0.001, Surfers vs GP, V = 1377, p = <<0.001; Figure 3.3). Therefore Gamers and Surfers are comparable in two of the three IM subscales yet score significantly higher than the GP in all three of these subscales (Pelletier et al., 1995, Figure 3.3). This suggests that Gamers and Surfers share similar intrinsic motives for participation in their respective activities and that these similarities differ from the wider population.

The study used for comparison (Pelletier et al., 1995) had a large sample of (n = 593) which indicates a good representation of a wider population. Pelletier et al.’s (1995) study also had a more similar sex ratio (319 males, 274 females, a 54:46 % ratio) than the male-biased samples in this study (Surfers = 37 males & 15 females ≡ 71:29 % ratio; Gamers = 46 males, 6 females ≡ 89:11 % ratio).

Pelletier et al.’s (1995) study shows males to have slightly higher IM subscale scores than females (Pelletier et al., 1995), and although some of these differences are significant, they are subtle (see table 4.1). This gender
difference in sports motivation is supported in other research that has used the
SMS to measure motivation (Baena-Extremera et al., 2014) and in research
that has used a different scale (Afsanepurak et al., 2012) but Diehm and
Armatas (2004) discovered no evidence of a gender difference via the SMS in
their research. These studies all had young samples (below 40) with relatively
even splits of gender although the sample sizes ranged from \( n = 85 \) (Diehm and
Armatas, 2004) to \( n = 1298 \) (Baena-Extremera et al., 2014).

It cannot be ruled out, although it is unlikely, that the male dominance in the
samples could be the causation behind these differences. This suggests that
the pronounced, significant differences in Gamers and Surfers from this study in
comparison to these previously published ‘norms’ (Table 4.1; Pelletier et al.,
1995) in relation to all facets of IM.

Table 4.1. Comparison of mean Intrinsic Motivation subscale scores obtained for Surfers and
Gamers from this study and Females and Males from Pelletier’s (1995) study used as a general
population. A * denotes a significance (\( p<0.05 \)) between the groups within the respective
studies. Comparison between the studies can be seen in Table 3.1 and Figure 3.3.

<table>
<thead>
<tr>
<th>IM subscale</th>
<th>Females</th>
<th>Males</th>
<th>Gamers</th>
<th>Surfers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know</td>
<td>13.05*</td>
<td>12.42*</td>
<td>20.7*</td>
<td>19.7*</td>
</tr>
<tr>
<td>Accomplishment</td>
<td>14.88*</td>
<td>14.17*</td>
<td>22.4</td>
<td>20.8</td>
</tr>
<tr>
<td>Stimulation</td>
<td>14.57</td>
<td>14.76</td>
<td>23.1</td>
<td>22.7</td>
</tr>
</tbody>
</table>

Findings in this thesis support findings from the only other research to focus
specifically on surfers and motivation (Diehm and Armatas, 2004) where surfers
were found, using the SMS, to have significantly higher IM scores than golfers.
Diehm and Armatas (2004) found the mean Total Intrinsic Motivation (TIM)
scores for surfers to be 48.2. With a maximum of 84 on the TIM scale this score is actually still quite low, especially when compared to the mean value for Surfers (63.2) found in this study and the mean value of TIM for Gamers (66.1) was even larger (Table 4.2). Diehm and Armatas' (2004) work is a good comparison to this study as there was a similar male sex ratio bias in Surfers (69:31 % ratio), although this male bias was greater in Gamers (88:12 % ratio) in this study. These findings reflect what is reported on the male dominant demography of surfers (Wagner, Nelsen and Walker, 2011; Mills and Cummins, 2013). More competitive surfers (30%) made up Diehm and Armatas' (2004) sample than the sample in this study (2%). This could have potentially been of importance if EM scores were higher in Diehm and Armatas' (2004) study as it would be expected that competitive athletes would be driven extrinsically by rewards or praise, yet this is not apparent as TEM scores for surfers (34.4) in Diehm and Armatas' (2004) research is low (Table 4.2).

Table 4.2. Comparison of Total Intrinsic Motivation and Total Extrinsic Motivation mean scores obtained for Surfers and Gamers from this study and Golfers and Surfers from Diehm and Armatas' (2004) study.

<table>
<thead>
<tr>
<th>Surfers</th>
<th>TIM</th>
<th>TEM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63.2</td>
<td>41.1</td>
</tr>
<tr>
<td>Gamers</td>
<td>66.1</td>
<td>42.8</td>
</tr>
<tr>
<td>Golfers</td>
<td>44.4</td>
<td>36.7</td>
</tr>
<tr>
<td>Surfers</td>
<td>48.2</td>
<td>34.4</td>
</tr>
</tbody>
</table>

To the best of my knowledge the modified SMS for Gamers has not been used before in other studies so there are no comparisons to other data and little work
has been published regarding gaming and motivation. Although Diehm and Armatas (2004) used the SMS to specifically target surfers it is unclear from their Methodology as to whether they used a modified version of the SMS or the standard version so the latter is assumed. So although the SMS has been used and validated in other studies in relation to sports (Shaw, Ostrow and Beckstead, no date; Webber, 2002; Baena-Extremera et al., 2014), for which it was initially designed, it has not been validated in a gaming context. The advantage of using the same scale of measurement means the data for both groups was generated using the same, although slightly modified (Figures 2.2), questions with the same seven point Likert scale. This suggests that the SMS could be utilised across a broader range of activities and populations as a more general motivational scale but further research would be required to confirm this.

Previous studies that have investigated motivation in gaming have used alternative scales to look at just EM (Lafrenière, Verner-Filion and Vallerand, 2012) or to investigate the relationship between passion and motivation (Wang et al., 2008) and therefore did not produce comparable data.

4.1.2 Extrinsic Motivation

The findings regarding the EM subscales are not as clear as the IM findings. Gamers and Surfers scored significantly higher in ‘Identified regulation’ in comparison to the GP data in Pelletier’s (1995) study (Figure 3.4). Also Gamers show a higher than ‘norm’ ‘Introjected regulation’ score and Surfers showed a similar tendency \( p = 0.078; \) Figure 3.4) when compared to the GP. Therefore both groups have also shown to have some higher than norm aspects of EM as well as IM. ‘Identified regulation’ relates to the development and growth of an
individual and this could explain the significantly higher score for this subscale found in Gamers and Surfers when compared to the wider population. It is part of modern culture to seek validation through social media platforms (Flaxington, 2016; Nair, 2017) and due to the interconnectivity of games with social media it is much easier to advertise and validate progression to your peer group by ‘posting’ those achievements. Also progression and achievements in video or internet based games are usually ‘stored’ for future reference and therefore future sharing. This ability to instantaneously obtain feedback from the game and then recognition from peers could enhance the development and growth of the individual and their standing within the peer group. This could also explain why Gamers had a higher, although not significant, ‘External regulation’ score than both Surfers and the GP (Figure 3.4) as an element of the ‘External regulation’ subscale is concerned with external praise. Surfers are a subculture that portray a strong image and identity (Pavlidis, 2014; ucsdkipher, 2014) so to ‘belong’ to this group through identification can be important to a surfer and their development. The ideals and imagery relating to the identity of this subculture have been and are currently portrayed in media and advertising (Westwick and Neushul, 2013).

Neither Gamers, Surfers nor the GP are driven by material rewards as all groups ‘External regulation’ subscale scores overlap extensively (Figure 3.4; Pelletier et al., 1995).

EM subscale scores, which although significantly higher than the norm, are not as contrasting and the significances are not as great as those found for IM (Figures 3.3 & 3.4). This is consistent with the findings that surfers have a lower mean TEM score than golfers (Table 4.1) although they were not found to be significantly different (Diehm and Armatas, 2004). The mean TEM scores from
this study for Surfers and Gamers are more comparable to the mean values from Diehm and Armatas' (2004) study and less pronounced than the same comparison between the mean TIM scores (Table 4.1). Mean scores in both ‘Identified regulation’ and ‘Introjected regulation’ were not greater than 2 points on the scale (Figure 3.4) when compared to the mean values published in Pelletier’s (1995) study. Differences in IM range from 5 to 8 on the scale when compared to the same study (Pelletier et al., 1995; Figure 3.3). Both Gamers and Surfers showed no difference in the EM subscale ‘External regulation’ when compared to Pelletier’s (1995) ‘norms’ (Figure 3.4). This evidence suggests that intrinsic motives and drivers, relating to enjoyment, experience and progression are important to both Gamers and Surfers in this study.

4.2 Sensation Seeking

Sensation seeking is related to individuals who seek ‘varied, novel, complex and intense sensations and experiences’ (Zuckerman, 1983) and the importance of a stimulating environment or activity has already been discussed in relation to the intrinsic motives of Gamers and Surfers (section 4.1.1). This psychological requirement is also highlighted within their personalities via the high ‘sensation seeking’ (ImpSS) scores found in this study for both groups (Figure 3.1) although Surfers had a significantly higher mean ImpSS score than Gamers (Figure 3.1). This suggests that Surfers are bigger sensation seekers than Gamers and can possibly be explained by the potential risks that are associated with extreme sports such as surfing. Sensation seekers not only seek ‘complex and intense experiences’ but also take ‘physical and social risks’ (Zuckerman, 2002) and surfing is known as an ‘extreme sport’ where ‘risk
taking’ can be a motive (Kerr and Houge Mackenzie, 2012). Both groups participate in ‘complex and intense environments’ albeit one is virtual whilst the other is natural, so it is not surprising that both groups ImpSS scores were significantly greater than the GP (Figure 3.1) but it is the addition of the ‘risk taking’ element of ‘sensation seeking’ that potentially explains the Surfers higher ImpSS scores than that of Gamers.

Diehm and Armatas (2004) also recorded ImpSS scores for surfers and also found them to have higher sensation seeking scores then their comparison (golfers) although a slightly different version of Zuckerman’s ‘sensation seeking’ scale (SSS) was used (SSS-V) in the study. This is still comparable because although the SSS has gone through several developments (Zuckerman, 1971, 2002; Aluja, Kuhlman and Zuckerman, 2010) they are all still based on the same constructs. High ‘sensation seeking’ is a trend that can be seen in other studies relating to ‘extreme, high risk sports’ such as skydivers (Prochiak, 2011) skiers and snowboarders (Thomson and Carlson, 2014; Maher, Thomson and Carlson, 2015) and downhill mountain biking (Malkin and Rabinowitz, 1998).

When compared to previous work on a general population (GP; Goma-i-Freixanet and Ventura, 2008) the mean scores for Gamers and Surfers in this study were found to be significantly higher than the published mean values (Figure 3.1). Although there is a significant difference in ‘sensation seeking’ between the two groups in this study (~2 points on the scale) the difference in the ImpSS scores is not as substantial as the difference between the groups and Goma-i-Freixanet and Ventura’s (2008) study (Gamers vs GP = ~4 points; Surfers vs GP = ~6 points). So although the two groups within this study are significantly different, the key findings are the differences between the groups and the GP. These findings suggest that both Gamers and Surfers are high
sensation seeking individuals in relation to the ‘norms’ although *Surfers* are bigger sensation seekers possibly due to the ‘risk taking’ element of the activity. An earlier study by (Gomà-I-Freixanet *et al.* (2004), on a Spanish sample \(n = 933\)), also supports these findings. A mean ImpSS value of 9.78, higher than the 2008 study (7.76), was published which, although closer to the results of this study, are still between 2 and 4 points lower than the mean values reported here. Both of Gomà-I-Freixanet *et al.*’s studies (2004 & 2008) were based on large sample sizes \((n=993; n=1000\), respectively) so, as explained earlier (section 4.1.1), this is a good representation of the wider population and therefore increases the significance of the ImpSS scores for *Gamers* and *Surfers* in relation to the GP.

Gamers have also been shown to have slightly high ‘sensation seeking’ scores (Mehroof and Griffiths, 2010) and ‘sensation seeking’ has also been linked to online gaming (Hu *et al.*, 2017) and internet dependency (Rahmani and Lavasani, 2011).

### 4.3 Addiction

There are many reports regarding addiction and dependency associated with drug and alcohol abuse (Franques *et al.*, 2002; Sargent *et al.*, 2010; Adams *et al.*, 2012). It is also suggested that individuals can show symptoms of addiction or even dependency in less obvious activities such as gambling, sex, exercising or computer gaming (Griffiths, 2005) and these have been referred to as ‘non-drug’ or ‘behavioural’ addictions (Potenza, 2015; Zastrow, 2017). Dependency can be diagnosed when someone uses an activity to alter their mood, has conflict with loved ones over excessive or unreasonable participation or when
there are negative connotations related to when they cannot undertake the activity for whatever reason (Griffiths, 2005).

The distributions of ‘addiction’ scores for Gamers and Surfers overlapped extensively and did not differ significantly ($\bar{x} = 16.6$ and $\bar{x} = 16.5$ respectively; Figure 3.5) suggesting that similar levels of addiction can be found in Gamers and Surfers in relation to their respective activities. The Exercise Addiction Inventory (EAI) was designed by Terry and Griffiths (2004) and is used in this study to measure addiction. A score on this scale between 12 and 23 indicates that the respondent has symptoms of addiction to exercise. Therefore the mean scores of $\sim 16.5$, generated for both Gamers and Surfers in this study, fall well within these ‘addicted’ thresholds (Figure 3.5). Although the mean scores are comparable between the two groups there were significantly more ‘dependent’ Surfers than Gamers. A composite score of 12 or less, on the EAI, indicates that the respondent is at risk of dependency to their chosen activity and Surfers had 15 dependent respondents as opposed to Gamers who had 5 (Figure 3.6). Surfing is referred to as a lifestyle sport (Pavlidis, 2014) in which the passion and desire to go surfing rarely diminishes with age or responsibility (Mills and Cummins, 2013). Gaming is an activity that is often associated with the youth culture (Siomos et al., 2008; Young, 2009; Adachi and Willoughby, 2017) and adolescence (Hu et al., 2017) and the freedom and lack of responsibilities that this allows. The lifelong commitment to surfing could potentially explain why there were more ‘dependent’ Surfers than Gamers. Eighty eight percent of Surfers in this study were between the ages of 16 and 25, which is a young sample when considering the majority of UK surfers fall within the ages of 25 and 44 (Mills and Cummins, 2013). But this is the same with the Gamers
sample in this study as 96% fall within the ages of 16 to 25 when demographic research shows that the highest proportion of UK gamers fall within the 25 to 44 age range (Ukie, 2017). So, although the samples within this study are not representative of the average UK gamer or surfer, the samples are comparable as they are both young representatives of the respective groups. It is recognised that a reason for the low sample age for the Surfer sample was that the data was collected from a ‘student’ body but it is not clear as to why the Gamer sample does not reflect the published demographics (Ukie, 2017) unless a younger gamer is more likely to attend a gaming festival such as ‘Insomnia’.

From an observational aspect, the age of the attendees at ‘Insomnia’ seemed comparable to the attendees at BUCS.

Research utilising the EAI has shown that people can be addicted to specific exercise such as CrossFit (Lichtenstein and Jensen, 2016) or triathlon and Ironman events (Youngman and Simpson, 2014). Although no other studies could be found that use the EAI to measure ‘lifestyle’ or ‘extreme’ sports, negative effects of addiction and craving, consistent with substance abuse, have been reported in rock climbers (Buckley, 2016), also referred to as a lifestyle or extreme sport (Rickly-Boyd, 2012). Five percent of CrossFitters (Lichtenstein and Jensen, 2016) were at risk of addiction and 20% of triathletes (Youngman and Simpson, 2014) as measured by the EAI. In Surfers, 62% were at risk of addiction with a further 29% being at risk of dependency. The fact that the majority (91%) of Surfers were at risk of addiction or dependency could simply show that the large majority of surfers evidence symptoms of addiction or it could be that the EAI is an inappropriate scale to use with recreational activities such as surfing. Participants of recreational activities want to participate for fun rather than the physiological and aesthetic benefits of hard
exercise, like CrossFit where individuals feel they need to participate for these specific gains. A high percentage of Gamers also showed risk of addiction (82%) or dependency (10%) as measured by the EAI which again could suggest that this scale is inappropriate for this type of activity or simply that levels of addiction are high in gamers.

The data collected and subsequent analysis in this study are comparable as for both groups it has been generated using, essentially, the same questions with the same five point Likert scale (Figure 2.3). More comparable research, using the EAI to measure risk of addiction in recreational activities, should be encouraged to clarify whether the EAI is suitable for this purpose.
5 Implications of this study

The benefits of exercise in a natural environment (Kaplan and Kaplan, 2011) whether it is a green (e.g. field or park; Huynh et al., 2013) or blue (e.g. ocean or lake; Depledge and Bird, 2009) space have been well documented (Bowler et al., 2010; Maxwell and Lovell, 2016; White et al., 2016). Activity within the natural environment not only gives the participant the physiological benefits of physical exercise (Wilson, Ellison and Cable, 2015) but also the psychological and ‘restorative’ benefits (Ulrich, 1983) of the ‘outdoors’ enhancing overall wellbeing (Stubbe et al., 2007) and Quality of Life (QoL).

Exercise and sports have been investigated as ‘therapeutic interventions’ (Pedersen and Saltin, 2006; Crone and Guy, 2008; Mota-Pereira et al., 2011; Schuch et al., 2011) with some of those taking place in the natural environment (Depledge and Bird, 2009; Pittsinger, 2009; Clapham et al., 2014; Rosenberg et al., 2014; Caddick, Smith and Phoenix, 2015) and some practitioners prescribing exercise or physical activity (Bauers, 2015). Therefore the exchange of a low energy activity, such as gaming, for a high energy activity, such as surfing, could potentially be utilised as a therapeutic intervention. If the high energy activity is undertaken in the natural environment then the previously discussed benefits of this could enhance the health, well-being and QoL of low energy activity participants.

One of the major obstacles is getting inactive people active, with lack of time and lack of offering being the biggest factors (Kompan, no date). In a community where there are plenty of potential for offering, such as Newquay in the UK where personal observations suggest there are in excess of 20 operating surf schools, then encouraging and educating these companies in the
benefits of such a programme is important. This could potentially enable some free or heavily subsidised therapeutic sessions to take place and be monitored for effectiveness. Recognition of a ‘problem’ by sufferers and a willing to engage in such a programme is paramount and this could be encouraged through current support groups, such as ‘On-Line Gamers Anonymous’ and ‘Computer Games Addicts Anonymous’ (Olganon, no date; CGAA, 2016) and recognition of IGD/GA officially by the World Health Organisation in the 2018 IDC-11.
6 Conclusions

To my knowledge there is no other research that compares facets of psychology and personality between specific groups and suggests that these psychological facets could help specify an intervention for an ‘at risk’ group. This research highlights important psychological similarities in Intrinsic Motivation, Extrinsic Motivation, the majority of the associated subscales and Addiction between Gamers and Surfers. Importantly some of these similarities are strikingly different from comparable research on the wider population especially in relation to Intrinsic Motivation and Sensation Seeking.

Encouragement to increase activity levels, and the directly related well-being factors, for potentially ‘at risk’ individuals is an important issue. Psychological requirements could be met by utilising a high energy, outdoor activity as an intervention for an excessively practised low energy, indoor activity but further research is necessary to confirm this. Confirmation of this could maximise the potential for the success of the intervention with the potential for conversion to a therapeutic lifestyle change.
7 Appendices

7.1 Normality and Homogeneity of Variance tests

All questionnaire data was tested for normality with Shapiro Wilk test and homogeneity of variance with the Bartlett test.

7.1.1 Exercise Addiction Inventory

![Normal Q-Q Plot](Image)

Figure 7.1. Normality plot of EAI scores for Gamers and Surfers.

Shapiro-Wilk normality test: $W = 0.98408$, p-value $= 0.2482$

Bartlett test of homogeneity of variances: Bartlett's K-squared $= 3.1808$, df $= 1$, p-value $= 0.07451$

Therefore these data do not differ significantly from normality or show homogeneity of variance"
7.1.2 Sensation Seeking Scale (ImpSS)

![Normal Q-Q Plot](image)

Figure 7.2. Normality plot of ImpSS scores for Gamers and Surfers.

Shapiro-Wilk normality test: $W = 0.95641$, $p$-value $= 0.001751$

Bartlett test of homogeneity of variances: Bartlett's $K$-squared $= 5.016$, $df = 1$, $p$-value $= 0.02511$

Therefore these data differ significantly from normality and show homogeneity of variance.
7.1.3 Intrinsic Motivation – Accomplish subscale

![Normal Q-Q Plot]

Figure 7.3. Normality plot of Intrinsic Motivation – Accomplish subscale scores for Gamers and Surfers.

Shapiro-Wilk normality test: \( W = 0.95822, p\text{-value} = 0.002359 \)

Bartlett test of homogeneity of variances: Bartlett's K-squared = 0.080191, df = 1, p-value = 0.777

Therefore these data differ significantly from normality and do not show homogeneity of variance.
7.1.4 Intrinsic Motivation – Know subscale

Figure 7.4. Normality plot of Intrinsic Motivation – Know subscale scores for Gamers and Surfers.

Shapiro-Wilk normality test: $W = 0.97785$, $p$-value = 0.07863

Bartlett test of homogeneity of variances: Bartlett’s $K$-squared = 0.80216, $df = 1$, $p$-value = 0.3704

Therefore these data do not differ significantly from normality or show homogeneity of variance
7.1.5 Intrinsic Motivation – Stimulation subscale

Figure 7.5. Normality plot of Intrinsic Motivation – Stimulation subscale scores for Gamers and Surfers.

Shapiro-Wilk normality test: $W = 0.9572$, $p$-value $= 0.001992$

Bartlett test of homogeneity of variances: Bartlett's K-squared $= 0.087842$, df $= 1$, $p$-value $= 0.7669$

Therefore these data differ significantly from normality but do not show homogeneity of variance.
7.1.6 Total Intrinsic Motivation

![Normal Q-Q Plot](image)

Figure 7.6. Normality plot of Total Intrinsic Motivation scores for *Gamers* and *Surfers*.

Shapiro-Wilk normality test: $W = 0.98699$, p-value = 0.408

Bartlett test of homogeneity of variances: Bartlett's K-squared = 0.1471, df = 1, p-value = 0.7013

Therefore these data do not differ significantly from normality or show homogeneity of variance.
7.1.7 Extrinsic Motivation – Externally Regulated subscale

Figure 7.7. Normality plot of Extrinsic Motivation – Externally regulated subscale scores for Gamers and Surfers.

Shapiro-Wilk normality test: $W = 0.95043$, $p$-value $= 0.0006737$

Bartlett test of homogeneity of variances: Bartlett's $K$-squared $= 0.21119$, df $= 1$, $p$-value $= 0.6458$

Therefore these data differ significantly from normality but do not show homogeneity of variance.
7.1.8 Extrinsic Motivation – Identified Regulated subscale

Figure 7.8. Normality plot of Extrinsic Motivation – Identified regulated subscale scores for Gamers and Surfers.

Shapiro-Wilk normality test: $W = 0.97925$, p-value $= 0.1021$

Bartlett test of homogeneity of variances: Bartlett's $K$-squared $= 0.0014052$, df $= 1$, p-value $= 0.9701$

Therefore these data do not differ significantly from normality or show homogeneity of variance.
7.1.9 Extrinsic Motivation – Introjected Regulated subscale

Figure 7.9. Normality plot of Extrinsic Motivation – Introjected regulated subscale scores for Gamers and Surfers.

Shapiro-Wilk normality test: $W = 0.98273$, p-value $= 0.1946$

Bartlett test of homogeneity of variances: Bartlett's K-squared $= 0.0869$, df $= 1$, p-value $= 0.7682$

Therefore these data do not differ significantly from normality or show homogeneity of variance.
7.1.10 Total Extrinsic Motivation

Figure 7.10. Normality plot of Total Extrinsic Motivation scores for *Gamers* and *Surfers*.

Shapiro-Wilk normality test: \( W = 0.98492, \) p-value = 0.2877

Bartlett test of homogeneity of variances: Bartlett’s K-squared = 0.24154, df = 1, p-value = 0.6231

Therefore these data do not differ significantly from normality or show homogeneity of variance.
7.2 Demographic data

7.2.1 Gender differences of Gamers and Surfers

Figure 7.11. Gender differences of Gamers and Surfers.
7.2.2 Age ranges of Gamers and Surfers

Figure 7.12. Age ranges of Gamers.

Figure 7.13. Age ranges of Surfers.
7.2.3 Experience ranges of Gamers and Surfers in years

Figure 7.14. Experience (in years) of Gamers.

Figure 7.15. Experience (in years) of Surfers.
7.2.4 Participation frequency of *Gamers* and *Surfers*

![Participation frequency of Gamers and Surfers in their chosen activities.](image1)

Figure 7.16. Participation frequency of *Gamers* and *Surfers* in their chosen activities.

7.2.5 Participation frequency of *Gamers* in physical activity and *Surfers* in gaming.

![Participation frequency of Gamers in physical activity and Surfers in gaming.](image2)

Figure 7.17. Participation frequency of *Gamers* in physical activity and *Surfers* in gaming.
8 Reference list


CDC (2015a) *Target Heart Rate and Estimated Maximum Heart Rate, Physical Activity*. Available at:


and Bierut, L. J. (2010) ‘Predicting Sensation Seeking From Dopamine Genes’, 
*Psychological Science*, 21(9), pp. 1282–1290. doi:
10.1177/0956797610380699.

risk-taking, satisfying needs for sensation seeking and experience seeking’, 
*Personality and Individual Differences*, 36(3), pp. 663–677. doi: 10.1016/S0191-
8869(03)00124-7.

Ding, D., Lawson, K. D., Kolbe-Alexander, T. L., Finkelstein, E. A., Katzmarzyk, 
inactivity: a global analysis of major non-communicable diseases’, *The Lancet*. 
Elsevier Ltd, 388(10051), pp. 1311–1324. doi: 10.1016/S0140-6736(16)30383-
X.

gambling among male and female adolescents: Gender similarities and 
differences’, *Journal of Adolescence*. Elsevier Ltd, 36(1), pp. 129–137. doi:

Donohew, L., Zimmerman, R., Cupp, P. S., Novak, S., Colon, S. and Abell, R. 
(2000) ‘Sensation seeking, impulsive decision-making, and risky sex: 
implications for risk-taking and design of interventions’, *Personality and 
Individual Differences*, 28(6), pp. 1079–1091. doi: 10.1016/S0191-
8869(99)00158-0.

ESPN (no date) *The Most Demanding Sports*. Available at: 
2017).
Flaxington, B. D. (2016) *Seeking Validation Online Doesn’t Bring Real Happiness.* Available at: https://www.psychologytoday.com/blog/understand-other-people/201602/seeking-validation-online-doesn-t-bring-real-happiness.


Harvard School of Public Health (no date) Examples of Moderate and Vigorous Physical Activity, Obesity Prevention Source. Available at: https://www.hsph.harvard.edu/obesity-prevention-source/moderate-and-vigorous-physical-activity/.


Insomnia (no date) *Insomnia Gaming Festival*. Available at: http://insomniagamingfestival.com/insomnia/home/.


on the United Kingdom’.


NHS (2015b) Physical Activity Guide for Adults, Live Well. Available at:

NIH (2012) Principles of Drug Addiction: A Research-Based Guide. Available at:

Odriozola, J. and Frisch, K. (2017) Wave Garden: History. Available at:


Olganon (no date) On-Line Gamers Anonymous. Available at:
http://www.olganon.org/home.


obligatory runners, obligatory weightlifters, and sedentary individuals.’, 
*International Journal of Eating Disorders*, 7(6), pp. 759–769. Available at:

Pavlidis, A. (2014) *The cultural politics of lifestyle sports, Leisure studies*. doi:
10.1080/11745398.2014.897239.


https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristi


ucsdkipher (2014) *Surfing as a lifestyle, not a product*, *Cultural Politics of Sport*. Available at: https://sportcultures.wordpress.com/2014/03/21/surfing-as-a-lifestyle-not-a-product/.
Ukie (2017) *UK Video Games Fact Sheet*.


