It was the Best of Times, it was the Worst of Times[1]:

Understanding the Relationship of Hassles and Mood in New Zealand Elite Athletes

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1. Part of the title of this thesis, 'it was the best of times, it was the worst of times," is taken from Dickens (1859).

Abstract

Elite athletes pursuing a career in high performance sports face numerous hassles that can potentially lead to depression. In recent years, research on athlete mental health has gained momentum, driven by increased awareness of the challenges associated with this environment. However, there remains a dearth of published research on the mental health of elite athletes in New Zealand. A cross-sectional repeated measures online survey was available to athletes 18 years or older from 14 different sports disciplines associated with the High Performance Sport New Zealand athlete support program. Information was gathered on sport-specific challenges along with daily hassles and depression symptoms. Statistical analysis was performed to explore hypothesised group differences and relationships amongst constructs. In addition, a comparison to a study in 2015 was conducted. A total of 126 elite New Zealand athletes were included in the final analysis. Elite athletes experiencing symptoms consistent with depression were similar to rates seen in 2015, with 21.4% meeting the criteria for moderate symptoms consistent with depression. From this, 12.7% met the criteria for major symptoms consistent with depression, an increase from 2015. Current athletes showed a significant increase in hassles severity compared to 2015; however, this was not seen in the frequency of hassles. The daily hassles that received the highest endorsements were "rising prices of goods," followed by "troubling thoughts about the future," and "not getting enough sleep". The frequency and severity of hassles were found to be significant predictors of symptoms consistent with depression after controlling for demographic and sport-specific variables. Athletes who competed as individuals were significantly associated with increased hassles and had a 6.8 times increased risk of experiencing symptoms consistent with depression. Athletes considering retirement or soon to retire had a significantly increased frequency of hassles. Males were associated with increased severity of hassles. Athletes younger than 25 compared to those over 25 were significantly associated with symptoms consistent with depression. The findings indicate that although the overall incidence of symptoms consistent with depression has stabilised since 2015, individuals who exhibit these symptoms are experiencing them more severely, which is a cause for

concern. The lack of an overall increase could be attributed to strategies implemented due to results from the 2015 study. These current findings highlight the relationships between hassles and symptoms consistent with depression; however, the study does not illuminate other factors. It suggests that the mental health of New Zealand elite athletes has remained consistent over the past 7 years and speaks highly to current mechanisms in place to support elite athletes. It would be beneficial to repeat this study in 2027, 1 year prior to the Olympic Games in Los Angeles, to enhance our understanding of this unique group and allow findings to inform future mental health strategies.

Keywords: Depression, daily hassles, stress, mental health, elite athletes, New Zealand, high performance sport

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List of Abbreviations

Abbreviation	Definition
CESD-R	The Center for Epidemiologic Studies Depression Scale Revised
COVID-19	Corona Virus Disease 2019
DHS	Daily Hassles Scale
DSM	The Diagnostic and Statistical Manual of Mental Disorders 5th Ed.
DSMD	Diathesis-Stress Model of Depression
GAS	General Adaptation Syndrome
HP	High Performance
HPSNZ	High Performance Sport New Zealand
MDD	Major Depressive Disorder
NSO	National Sporting Organisation
NZ	New Zealand
PTL	Performance Team Lead
TMSM	Transactional Model of Stress and Coping

Explanation of Terms

New Zealand:	The use of the term New Zealand follows the traditional use of this name for the nation but also recognises the te reo Māori name “Aotearoa”.
Gender:	This study refers to male and female gender exclusively. While the researchers acknowledge that gender is not strictly binary, they provided an option for participants to self-identify as "other" if they wished to do so. However, none of the participants chose to identify themselves as "other".
Symptoms consistent with depression:	Within this research, symptoms of depression were assessed using The Centre of Epidemiologic Study Depression Scale Revised (Eaton et al., 2004). It should be noted that answers to this measure do not confirm a diagnosis of depression, but the questions that are asked in this tool are consistent with the criteria for Major Depressive Disorder (American Psychiatric Association, 2013). To address this issue, the phrase ‘symptoms consistent with depression’ has been used.
Hassles:	The term hassles refers to the 117 daily hassles as a group.
Daily hassles:	The term daily hassles is used when referring to individual hassles.

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Chapter 1: Context

Introduction

There is a prevailing misconception that mental strength is a prerequisite for success in high performance (HP) sports. Depression symptoms experienced by elite athletes are frequently cited in the literature (e.g., Kuettel et al., 2022; Wolanin et al., 2015) and reported by the media (e.g., Nimmo, 2021, August 11; Scutti, 2018). With the aim of providing improved support to athletes, research aimed at comprehending the difficulties faced by this specialised group has significantly increased. However, there is limited research on the mental health trends of elite New Zealand (NZ) athletes.

The aims of the current study were to understand the relationship between hassles and depression symptoms while identifying which elite athletes in NZ may be at heightened risk of either. The findings will deepen the understanding of the types of daily hassles faced by NZ athletes, as well as the nature of the relationship between hassles and symptoms consistent with depression.

Structure of Thesis

Chapter 1 aims to establish the context for this study. The role of sport in NZ culture is described, along with its positive effects on health. The chapter emphasises the purpose behind the allocation of high performance (HP) sports funding and its evolution over time, particularly how it coincides with escalating mental health issues observed among elite athletes. Chapter 2 highlights the literature relevant to this study, particularly the theories and models that help in understanding the relationship between hassles, stress and health. The measurement of stress is discussed in relation to hassles, along with how limitations have informed new perspectives on the stress-health relationship, particularly depression. Chapter 3 outlines the common stressors elite athletes face, followed by a review of the relevant literature on mental health challenges that exist in this population. Chapter 4 discusses the aims of the current study and the hypotheses are outlined.

Chapter 5 details the methodological process, including research design, ethical considerations, participant recruitment, data collection and statistical procedures. In addition, a theoretical and psychometric review of the measures used in this study is presented. Chapter 6 presents the results of the study, including data screening and correction methods, descriptive statistics, and correlational analysis. This is followed by the results for each hypothesis. An exploratory analysis is undertaken, including analysis to compare the 2015 findings plus further analysis that extends the current study. Chapter 7 includes the discussion. The results of the hypothesis are discussed individually, with a wider discussion on the results of the exploratory analysis. The study's limitations, practical implications and future research follow. Lastly, the conclusion highlights the study's contribution to the literature.

The Pivotal Role of Sport in New Zealand

Sport is deeply ingrained in the fabric of NZ culture and plays an important role in shaping the nation's identity. It serves not only as a source of recreation and physical activity but also as a platform for national pride, social cohesion, and inspiring others. The feats of our most prominent sports teams, such as the All Blacks (national rugby team) or Team NZ (professional sailing team), along with individual athletes such as Sir Murray Hallberg, Dame Valerie Adams and Sir Edmond Hillary, have cemented this sporting identity globally. Combined with NZ's thriving grass-roots sports programme, sport has a profound impact on the health and wellbeing of individuals and communities. Sport is an integral part of life as an NZer, as captured aptly in a quote:

> New Zealanders believe winning in international events is important. It contributes to social, economic, and health benefits; helps create a strong sense of national identity, pride and social cohesion; creates a healthy image for marketing New Zealand goods, services and experiences abroad; helps attract high-profile sports events to New Zealand, with associated economic gains; and encourages New Zealanders to be active (Sport and Recreation New Zealand (2006b, p. 9).

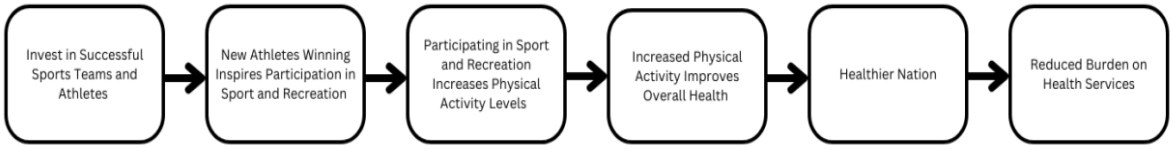
In addition to more indirect benefits that arise from sport, the most tangible benefits come from participating in them. Substantial evidence indicates that physical activity decreases the risk of

chronic diseases such as cardiac disease, stroke, cancers, diabetes and depression (World Health Organization, 2021c). According to the World Health Organisation (WHO), 1.6 million deaths a year can be attributed directly to insufficient physical activity (Global Burden of Disease Risk Factors Collaborators, 2016). Research has indicated that higher levels of physical activity at any intensity substantially reduce the risks of premature mortality in middle-aged and older adults (Ekelund et al., 2019). Furthermore, the benefits of increased activity levels are significant at relatively minor exercise volumes (Warburton & Bredin, 2017). Regardless of duration, intensity and activity type, the evidence shows that movement of any type has positive effects on health.

Alongside the positive effects on physical health, increased activity can also improve mental health, especially depressive symptoms. Engaging in physical activity not only reduces symptoms (Dimeo et al., 2001) but is protective against the onset of depression (Harvey et al., 2018; Mammen & Faulkner, 2013). The effectiveness of physical activity in reducing depressive symptoms is comparable to the use of antidepressants (Dinas et al., 2011) and has long-lasting effects (DiLorenzo et al., 1999). A recent meta-analysis of 49 prospective cohort studies, totalling 1,837,794 person-years, found that people with high levels of physical activity had 17% lower odds of depression compared to people with low physical activity, regardless of age or geographic region (Schuch et al., 2018). However, the mechanisms by which physical activity benefits an individual remain relatively unclear.

Figure 1

Model Showing Benefits of Investing in High Performance Sport



Encouraging individuals to participate in any form of physical activity is an important issue for the NZ Government (Sport New Zealand, 2020). A recent survey investigating activity levels

shows a downward trend, especially among individuals under 24 (Sport New Zealand, 2019). One avenue to increase participation is through the promotion of our most prominent athletes and sports teams. Success of our teams and athletes can inspire participation in sport and recreation, and create a healthier nation (see Figure 1). Healthier individuals lower the burden on our health sector, including hospital admissions (Thompson & Kumar, 2011).

Thus, the benefits of physical activity are important. The government has taken a two-pronged approach to its promotion. The first approach uses key messages promoting the benefits of physical activity to all NZers via marketing campaigns. One of the most well-known examples is the "Push Play" campaign. The campaign aimed to increase activity levels among NZers by raising awareness of the health benefits of 30 minutes of exercise per day (McCully, 1999). As a result of decreased activity levels during the COVID-19 pandemic, it was reintroduced in 2022. However, the second approach (arguably more powerful) and most relevant to this thesis is the promotion of NZ HP sports teams and elite athletes.

New Zealand's High Performance Sports Strategy

NZ elite athletes have a reputation for exceeding expectations when it comes to HP sports. HP sport can be defined as "the top end of sport development and encapsulates any athlete or team that competes at an international or national level" (Sotiriadou & De Bosscher, 2018). Despite having limited access to superior facilities and financial resources, New Zealand athletes consistently outperform much larger sporting nations. Often the tagline "punching above their weight' is used when discussing the exploits of Kiwi sportspeople (Jackson, 2004). At global sports events such as the Olympic Games, NZ often tops the "medals per capita" results table (New Zealand Olympic Committee, 2021). Capitalising on the achievements of athletes and teams has become a powerful tool in inspiring NZers to engage in physical activity.

Approximately half of all the Crown's investment into Sport and Recreation is spent on HP sport. By doing this, it is theorised that investing money into HP sports and athletes will create role

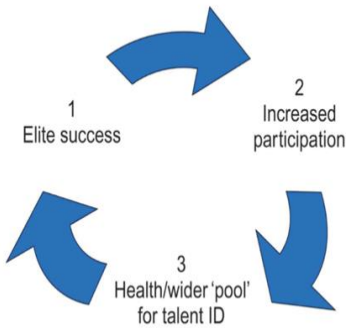
models and inspire grassroots participation, a phenomenon known as the “trickle-down effect” (Hindson et al., 1994, p. 60). Studies suggest that well-known athletes influence what sports young NZers choose to participate in and, furthermore, inspire a desire for success in these sporting endeavours (Angus and Associates, 2017).

Working alongside HP sport, the remainder of the Crown's investment goes into grassroots sports. This investment leans on the Double Pyramid Theory (Van Bottenburg, 2002). The Double Pyramid Theory states that “thousands of people practising sports at the base leads to a few Olympic/World champions and, simultaneously, the existence of a champion role model, in turn, inspires thousands of people to take up some form of sport” (Van Bottenburg (2002, p. 3).

Both strategies for investment work in unison. The investment, and therefore visibility, inspires NZers to be active, while simultaneously investing in grassroots sport ensures athletes are on a pathway to success in the future. This dynamic relationship is also known as the “virtuous cycle of sport” (see Figure 2) (Van Bottenburg, 2002, p. 3). However, both systems must strike the right balance in order to ensure that the system is effective in nurturing both performance and wellbeing

Figure 2

Virtuous Cycle of Sport



Note. Reproduced from *Why do governments invest in elite sport? A polemic.* by J. Grix and F. Carmichael (2012). International Journal of Sport Policy and Politics, *4*(1), 73-90. Copyright 2012 by Taylor and Francis and the Copyright Clearance Center RightsLink

Targeted Sports Model

To create role models via international sporting success, NZ has had to be strategic with where and in whom it invests its resources. With limited finances and in an effort to keep up with the "global sporting arms race" (Oakley & Green, 2001), in 2009, NZ adopted a Targeted Sports Model. This model sought to narrow its focus in an effort to win more medals, therefore, creating more champions and more role models (Sport and Recreation New Zealand, 2006a). Instead of funding a broad range of athletes and sports, a narrow and more targeted approach was adopted (De Bosscher, 2008). Like other countries, a variety of factors, including satellite broadcasting of the Olympic Games, and the abandonment of amateurism, saw many nations increase HP sport investment and develop specialist athlete support systems to maximise achievements at Olympic Games (Houlihan & Zheng, 2013). This need to "keep up" is epitomised in the following quote:

> … winning on the international stage is becoming increasingly more challenging for New Zealanders. Talent alone is no longer enough to win. International sport has developed rapidly over the last decade with more money involved, and higher standards and professionalism being the norm. Other countries are committing substantial and increasing amounts of money. Being a small country, we have a smaller pool of athletes, and access to less expertise and fewer resources than some of our much larger rivals (Sport and Recreation New Zealand, 2006b, p. 9).

This model is aimed at supporting sports with a proven track record of success, rewarding them with the majority of the funding available. Underperforming athletes and teams led to a reduction in funding; the approach taken was quite uncompromising in nature. However, since the inception of this model, the number of medals won at the Olympic Games by NZ athletes and teams has increased (New Zealand Olympic Committee, 2021). Furthermore, most of those medals were won by the sports included in the Targeted Sport Model. There was no doubt that this targeted approach was delivering what it set out to achieve.

The focused model had a positive impact on some athletes, enabling them to adopt a more 'professional' and dedicated approach to their sport. Those who excelled in the targeted sports and ranked high in global standings received extensive assistance, including financial backing and access

to various support services including physiotherapy, nutritionists, specialised training facilities, sports physicians, and performance psychology. Athletes operating in this fashion could be considered “elite” athletes. There are numerous ways to define elite athletes (Swann et al., 2015); however, for this thesis, elite athletes are considered to be those who are involved in talent development and/ or are members of elite sport institutes/ training centres or national development programmes (e.g., Carless & Douglas, 2013).

A targeted sporting system, by nature, will create pressure to deliver results. While originally devised to enhance achievement, establish positive role models, and promote better health outcomes for the population, the system could now be viewed negatively as numerous elite athletes grapple with mental challenges in this high-pressure atmosphere, as noted by Cleaver (2018). Although research suggests that physical activity, in general, can benefit individuals by functioning as a buffer against stress (Coleman & Iso-Ahola, 1993; Iwasaki & Mannell, 2000), the stressors associated with elite sport can (for some) outweigh the potential benefits of participation. This unique situation faced by elite athletes has been captured aptly by Heron (2022, p. 38).

> Because athletes are the only stakeholders who can actually deliver medals, all the cumulative system pressures sit on their shoulders, but at the same time they are in the most precarious position (they are not employed, some are unpaid, and most have limited opportunity within their training programmes to gain external jobs/income and their position is insecure).

Summary

In summary, sports have a meaningful impact on the lives of NZers, both as participants and spectators. The government acknowledges this and promotes physical activity as a means of enhancing health outcomes. To achieve this goal, they invest in HP sports and elite athletes, which can serve as a source of inspiration and motivation for individuals and communities. Nevertheless, the escalating global competition for sporting success means that only a small group of athletes receive funding, placing them under significant pressure to perform exceptionally well.

Chapter 2: Relevant Literature:

Conceptualisations of Stress and the Link with Depression

Introduction

Stress is a ubiquitous experience that affects individuals across various cultures and ages. This chapter explores the nature of stress, its relationship with hassles, and its impact on health. The chapter's objectives include defining hassles and stress, examining their different causes and types, and presenting theories that have been proposed to explain the body's response to stress. Additionally, the chapter will explore the relationship between stress, hassles and health, with a focus on depression. It will also discuss major theories on the development of depression, along with their associated risk factors.

What is Stress?

The term homeostasis (Cannon, 1922) relates to the idea that to maintain life, we must keep our internal settings constant, even in the face of challenges. Anything deemed a threat to homeostasis was defined by Canadian endocrinologist Hans Selye (1956) as "stress". Selye defined stress as the non-specific response of the body to any demand for change; he later refined his definition to specify that stress is the body's response to any demand that disrupts homeostasis, whether the demand is external or internal. Since the early work by Selye, within academic research, there have been multiple perspectives on the conceptualisation of stress. As stipulated by the American Psychological Association (2021 para.1), for the purpose of this thesis, the following definition is used: "stress is the physiological or psychological response to internal or external stressors. Stress involves changes affecting nearly every system of the body, influencing how people feel and behave": a common affliction that most of the world experiences on a regular basis.

Eustress and Distress

Typically, stress is viewed as a negative concept, though at times, stress can be helpful. Selye (1956) referred to eustress or good stress as challenges that can be helpful. In such instances, the stressor challenges the individual, but no more than they can cope with; the stressor becomes a motivator to achieve the goal (Le Fevre et al., 2003). For example, the stress of preparing for a competition can be seen as eustress because it motivates us to work harder and perform better. Eustress can help develop resilience and coping skills to handle future stressors better.

More commonly, stress is viewed as a negative experience. Individuals often experience negative affect and physiological reactivity caused by the situation being overwhelming or perceived as a threat (American Psychological Association, 2021). Stress is often used interchangeably with the word distress, although theoretically, stress can be positive or negative. By definition, distress is a negative stress experience due to a discrepancy between an individual's ability and the demands of the situation, where failure has consequences.

Stressors

Researchers have come to a consensus that major life events or stressors can lead to stress in the average person. For this thesis, stressors are defined as any condition, force, or event, either internal or external, that can cause physical or emotional stress (American Psychological Association, 2021). According to Monroe (2008) and the life events checklist, some of the most difficult stressors for individuals include the loss of a loved one, job loss, receiving a serious illness diagnosis, or retirement. Nevertheless, there is uncertainty about what constitutes a significant stressor. Thus researchers have adopted differing approaches: rather than looking at the stressor itself, they have investigated the consequence of the event (Cohen et al., 2019).

The definition of stressors, and therefore their effects on health, have been debated in the literature. There are four main approaches to understanding this relationship. According to the approach by Holmes and Rahe (1967), a stressful event that requires an individual to make

adaptions or modifications in their life as a response can be deemed a stressor. This perspective suggests that stress caused by the event is a cumulative experience, with each event contributing to an individual's overall burden. Furthermore, this approach acknowledges that even positive events, such as marriage or vacations, can also be stressful as they require adaptive changes. The second approach deems stressful events to be those that are constantly seen as harmful or threatening (Brown, 1989), particularly when uncontrollable. In this approach, a single event could be considered a illness risk if the threat of risk is high enough.

The third approach is that stress (and strain) arise when demands exceed resources (Karasek et al., 1981). This theory stems from research on job stress and postulates that when job strain is high and decision-making freedom low, the combination equates to mental strain, poor health, or cardiovascular disease, in the case of this study. The final approach defines stressful events as interrupting personal goals. Cohen et al. (2019) summarised this approach, stating that threats to our social status, self-esteem, identity, and physical wellbeing represent core goals that have the potential to be interrupted by stressful events.

Chronic and Acute Stress

Various stressors can trigger stress, but stress can generally be classified into two broad types: chronic and acute. Chronic stress develops through stressors or threats that are ongoing or regular. The American Psychological Association (2021 para 1.) defines chronic stress as the "physiological or psychological response to a prolonged internal or external stressful event (i.e., a stressor)". The time frame to determine chronic stress is an area of contention within the literature; for example, Brown and Harris (2012) defined chronic stress as difficulties lasting longer than 4 weeks, whereas McGonagle and Kessler (1990) define chronic stress as ongoing difficulties for longer than 12 months. Regardless of the timeframe and for use in this thesis, it was agreed that the open-ended nature of a stressor defines it as chronic (Serido et al., 2004). The opposite of chronic stress is

acute stress. Hammen et al. (2009) defined acute stress or episodic stress as events or stressors with a relatively clear onset and conclusion (e.g., sitting an exam, or performing in a concert).

Stress and Anxiety

Often the terms chronic or acute stress are used interchangeably with anxiety; however, they have subtle differences. They are both psychological states that can be experienced together, but they are not the same thing. Stress is a response to external challenges such as work or financial difficulties; however, anxiety, on the other hand, is defined as persistent worry that doesn't go away, even in the absence of a stressor. Both stress and mild anxiety respond well to similar interventions such as meditation, adequate sleep and physical activity (American Psychological Association, 2019, October 28).

The Stress Response

Due to the high rates of stress experienced by individuals, extensive research has been conducted on its impact on health. Prolonged stress can lead to serious health problems such as heart disease, high blood pressure, and mental health disorders such as anxiety and depression (Selye, 1956). Numerous theories have proposed that chronic or acute stress can cause "wear and tear" on the body or allostatic load, leading to poorer health outcomes or disease (McEwen, 1998). To facilitate interventions, theories have been developed to comprehend the mechanisms that occur within individuals who experience high levels of stress and consequently, become unwell.

The General Adaptation Syndrome Theory

The General Adaptation Syndrome (GAS) theory, proposed by Selye in 1956, is a framework for understanding the body's response to chronic stress. According to this model, stress is a non-specific response to any demand, whether physical, emotional, or psychological. Unlike the immediate fight or flight response by Cannon (1932), the GAS theory describes the body's response

more broadly and comprehensively. A central tenet of the GAS theory is the body's ability to adapt to stress, which enables the organism to cope better. This long-term perspective contrasts with Cannon's approach in 1932. By understanding the body's response to stress, individuals can better manage the negative effects of stress on their health.

The GAS theory involves three stages of the body's reaction to stress: the alarm reaction, the resistance stage, and the exhaustion stage. The first stage, the alarm reaction, involves the body's initial response to stress, including physiological changes such as increased heart rate and adrenaline release. The second stage, the resistance stage, is characterized by the body's attempt to adapt to and cope with the ongoing stressor. Finally, in the exhaustion stage, the body's resources are depleted, leading to increased vulnerability to illness and disease (Selye, 1956).

Transactional Model of Stress and Coping

Identifying the limitations of the GAS theory, Lazarus (1966) introduced the concept of cognitive appraisals as a key determinant of the stress response. Lazarus proposed that how an individual perceives and evaluates a stressor (i.e., cognitive appraisal) determines the individual's emotional and physiological response to that stressor. Lazarus emphasised the role of emotions in the stress response. How the individual emotionally responds to a stressor plays an important part in the physiological response. Lazarus also developed the concept of coping as a mechanism for managing the negative effects of stress on health and wellbeing.

Cognitive appraisal theory is most notably used in the Transactional Model of Stress and Coping (TMSC) and was developed by Lazarus and Folkman (1984). The TMSC perceives the stress response as being influenced by how an individual interprets the stressors in their life rather than solely by the presence of the stressor. An individual's appraisal of the stressor determines how he or she copes with or responds to the stressor, and, therefore, within this perspective, stress is a transaction between the individual and the environment.

The TMSC framework consists of three main concepts: the individual, the environment, and the transaction between them. The individual components include personality, coping resources and past experiences. While the environmental components include the stressor itself and how it is appraised or perceived by the individual, with this appraisal determining the stress response.

The TMSC outlines two types of appraisals: primary appraisal and secondary appraisal. The primary appraisal phase, also termed 'relational meaning', is concerned with whether or not the stressor is "relevant to one's values, goal commitments, beliefs of the world, and situation intentions" (Lazarus & Folkman, 1984, p. 75). The most important principle is goal commitment; if there is nothing at stake for the person, no outcome goal they desire, there will be no stress reaction. Secondary appraisal assesses whether the individual can cope with the event or stressor. Lazarus and Folkman (1984) noted that each of these district appraisal phases always work interdependently.

The TMSC has important implications for health because it suggests that stress is not just a function of external events but also of an individual's appraisal of those events. This means that an individual's perception of stressors and their coping resources can impact their physical and mental health outcomes. In some cases, an individual may feel that they have limited coping resources and are unable to manage the stressor. Conversely, another person who believes they possess ample coping resources may handle stressful situations with greater ease.

The Stress-Health Relationship

The dominant approach to understanding the effects of stress on health has focused on major or dramatic events and how they relate to physical illness (e.g., Dohrenwend & Dohrenwend, 1974). This framework (known as the major events approach) differentiates between major life events and minor daily hassles as contributors to stress and the consequence on one's health. To quantify stress from major life events, Holmes and Rahe (1967) developed the Social Readjustment Rating Scale, also known as the Holmes and Rahe Stress Scale. The Social Readjustment Rating Scale

was based on the theory that readjustments from major life events substantially increased the risk of physical illness. The Social Readjustment Rating Scale is a list of 43 life events, each carrying a rating based on its perceived level of stress. For example, the death of a spouse is considered the most stressful life event on the scale, carrying a score of 100, whereas retirement carries a score of 50 and is considered a moderate stressor. The ability to assign a "stress score" to an individual has allowed a deeper understanding of the relationship between life events, stress and physical and mental health.

Over time, the Social Readjustment Rating Scale presented serious limitations in establishing a strong relationship between major life events and their consequences on health. Limitations such as weighting of events, reliability, individual differences and the lack of representative samples have impacted studies, causing difficulty in establishing a relationship (Rabkin & Struening, 1976; Steele et al., 1980). Rabkin and Struening (1976) noted only weak relationships between major events and health outcomes. Simultaneously, research was emerging investigating the moderating effects of an individual's social environment (e.g., social support) and health (Jenkins, 1979). The major life events approach (at the time) provided little insight into how these events affected people's health over time (Kaplan, 1979).

Minor Events Approach

Noting the weak relationship between major events and stress, around the 70s, a new approach to measuring stress started to emerge. The Minor Events approach involved looking at the more minor, common everyday events and their effect on stress levels (Lewinsohn & Talkington, 1979; McLean, 1976). Lazarus and colleagues pursued this avenue most comprehensively and inferred that day-to-day events would have a proximal significance for health outcomes; therefore, they should be measured (Coyne et al., 1979, April 6; Lazarus & Cohen, 1977; Lazarus, Cohen, et al., 1980). McLean (1976) summarised this relationship, saying that these small yet frequent and familiar stressors are often discounted compared to major stressful life events and that "micro stressors

acting cumulatively, and in the relative absence of positive compensatory experiences, can be potent sources of stress" (McLean, 1976, p. 298). Kanner et al. (1981) then went on to describe these common occurrences of stressors as daily hassles and their counterpart, pleasant events, as uplifts.

There are several possibilities for how minor events or (daily) hassles may manifest and impact an individual's life. Hinkle (1974) first suggested that minor events may disrupt a person's daily routines, social patterns, or habits, impacting health. Alternatively, Kaplan (1979) suggested that hassles may operate by disrupting a person's coping processes; therefore, they are seen as mediators of life events and health outcomes. In both instances, hassles may operate independently of major events and be a function of a person's characteristics (Kanner et al., 1981).

Hassles are defined as "irritating, frustrating, distressing demands that, to some degree, characterise everyday transactions with the environment" (Kanner et al., 1981, p. 3). Hassles can stem from multiple domains; for example, traffic jams, pollution and work life. Some hassles can repeat due to individuals staying in the same context (e.g., marriage discord, work issues) or combined with ineffective coping styles (e.g., hassles that involve the authorities; Kanner et al., 1981). However, ultimately, the meaning and experience of the hassle lie in its significance to the person.

Positive Events. Alternatively to hassles, it was theorised that positive events or uplifts could serve as an emotional buffer against stress disorders (Kanner et al., 1981). Lazarus, Kanner, et al. (1980) proposed that uplifts could play a role in coping in one of three ways: (i) breathers serving as a break from regular stressful events; (ii) sustainers of coping activity; and (iii) restorer*s* that help individuals replenish their coping abilities. Simple measurements of negative stress events without their counterparts, uplifts, may distort the stress-illness relationship.

In summary, stress is a common occurrence that impacts people of diverse cultures and ages. Researchers have acknowledged that major life events and minor hassles can contribute to stress. While major events may appear to be an apparent cause of stress, the impact of minor

hassles has shown significant associations with physical and mental health. The cumulative effect of these everyday hassles can slowly erode individuals' coping resources and negatively impact health. Having the ability to identify the different sources from which stress can evolve can be advantageous in defending against it.

Depression

Stress can have a significant impact on mental health, particularly in regard to depression (Selye, 1956). Depression is a debilitating mental health disorder, and it is estimated that 5% of adults will experience depression at some stage in their life (World Health Organization, 2021a). In some extreme cases, depression can lead to suicide. Suicidal ideation is one of the criteria for diagnosing depression. More than 700,000 people die by suicide every year, and suicide is the fourth leading cause of death among 15-19-year-olds (World Health Organization, 2021b).

The term depression is used in everyday language to describe a range of symptoms ranging from an alteration in mood to profoundly impaired states that can threaten life. Typically, symptoms involve loss of energy or motivation and a state of sadness that can last a few moments or even days (Hammen & Watkins, 2018). However, in this thesis, the researchers refer to depression as part of an affective disorder that is a diagnosable condition known as Major Depressive Disorder (MDD). The criteria for MDD are conveyed in the *Diagnostics and Statistical Manual of Mental Disorder* (5th ed.; DSM-5; American Psychiatric Association, 2013).

Depressive symptoms generally feature a low mood and/or a loss of pleasure. Furthermore, these are typically accompanied by somatic symptoms such as weight loss or weight gain, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness, a diminished ability to think or concentrate, and suicidal ideation (American Psychiatric Association, 2013). These symptoms must be present almost all day, every day, in the same 2-week period to meet the threshold for diagnosis of MDD (American Psychiatric Association,

2013). Functionally, MDD limits an individual's ability to perform their normal day-to-day duties (Malhi et al., 2015).

According to data from the NZ Health Survey, a substantial number of individuals in the country are affected by depression. Specifically, the survey found that during the 2021/22 period, the overall rate of depression was 19.3%, which translates to approximately 801,000 adults (Ministry of Health, 2022). This statistic pertains to individuals over the age of 15 and is based on self-reports of having received a diagnosis of depression from a healthcare provider.

Theories in the Development of Depression

Depression is a complex mental health condition affecting millions of people. Over the years, various theories have been proposed to explain the aetiology of depression. These theories range from biomedical models that emphasise the role of biological factors (Beck & Alford, 2009) to psychodynamic models that focus on unconscious conflicts (Freud, 1917) and behavioural models that highlight the role of learned behaviour (Beck, 1979). Furthermore, some models emphasise the interaction of these concepts (Monroe & Simons, 1991).

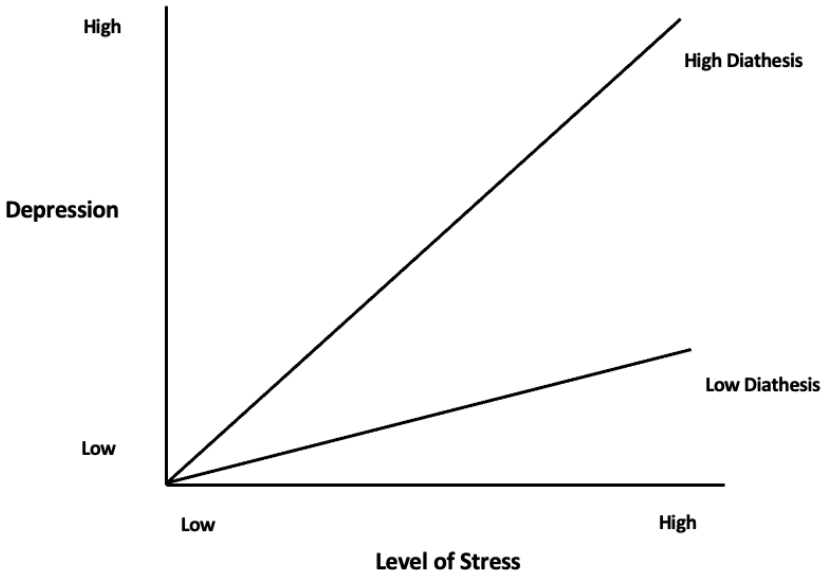
Diathesis-Stress Model of Depression (DSMD). The DSMD is a theoretical model that suggests depression results from an interaction between an individual's vulnerability to the disorder (diathesis) and exposure to stressful life events (Abramson et al., 1978; Beck, 1987; Robins & Block, 1989). The model suggests that stress activates diathesis, which can, in turn, bring about the onset of depression symptoms (see Figure 3; Monroe & Simons, 1991). This model is based on a temporal relationship between stress and depression, where depression is triggered by an unfortunate personal stressor.

The DSMD and the TMSC are closely related frameworks for understanding the development and maintenance of depression, but differ in their focus. Where the DSMD concentrates on vulnerabilities (or pre-dispositions to depression) and stressors, the TMSC looks at how the person appraises the stressor and whether they have adequate coping resources (Lazarus & Folkman, 1984;

Monroe & Simons, 1991). For example, a person who may never have previously experienced depression may face a stressor such as losing their job, which according to the DSMD, may interact with a genetic vulnerability and increase their risk of depression. In contrast, the TMSC would focus on how the individual appraises the job loss and their coping strategies in determining whether they experience depression.

Figure 3

Diathesis – Stress Model of Depression



Note. Reproduced from *Diathesis-stress theories in the context of life stress research: Implications for the depressive disorder* by Monroe and Simons (1991). The Psychological Bulletin, 110*, p. 413.* Copyright 1991 by the American Psychological Association and the Copyright Clearance Center RightsLink

The DSMD, when combined with Beck's cognitive theory (Beck, 1979) provides a non-biological explanation of vulnerability. The cognitive theory of depression suggests that stressors can trigger automatic thinking patterns, which in turn can lead to the development of depression. Automatic thoughts are said to fall into three categories: specifically, negative thoughts about (i) oneself, (ii) the world, and (iii) the future. Beck (1979) suggested that people with these negative views of the world also had unhelpful automatic thinking patterns, further fuelling depressive

symptoms. Together, these two theories highlight the complex interactions that can lead to the development and maintenance of depression.

Stress and Depression

According to Hammen (1992) an increase in stress levels is expected to raise the probability of experiencing depression. Hammen (1992, p. 185) extended this stress-depressional relationship further by saying, “matching the content of the event to a person’s apparent values about what is important to the sense of self, results in a more precise prediction of depression”. According to the summary by Mazure (1998) the occurrence of stressors is 2.5 times more likely in depressed cases versus controls. However, the relationship has been questioned due to the low incidence of depression, and thus a low correlation between stressors and depression (Monroe & Simons, 1991).

Studies have explored whether stress-induced depression has a greater impact on the development of depression in women than in men. However, the investigation of this is complicated by multiple factors. According to Bebbington et al. (1988) men and women may experience stressors differently based on role expectations, while Turner et al. (1995) suggest that sociocultural factors may result in women having higher exposure to stressors. Additionally, Salokangas et al. (1988) propose that larger social networks can also function as increased stressors for women. Thus, while research suggests that stress-induced depression may play a more significant role in the development of depression in women, it is crucial to consider the complex interplay of various factors that can contribute to this gender difference.

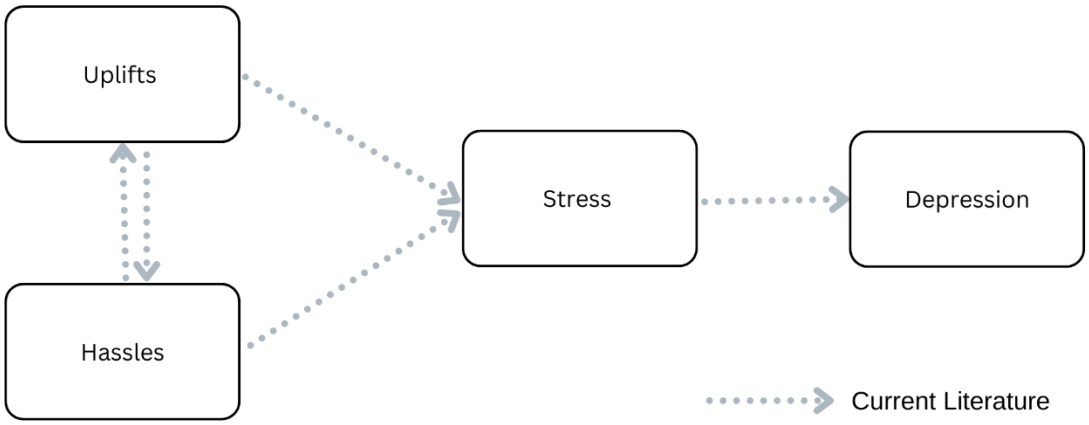
The Hassles and Depression Relationship

The relationship between hassles and depression continues to be supported by evidence (e.g., Jung & Jung, 1989). For instance, a study of 233 first-year psychology students found that hassles were a significant risk factor for depression (Bouteyre et al., 2007). Additionally, research that tracked individuals from adolescence to age 30 revealed that daily hassles were the most

consistent predictor of depression, as opposed to major life events (McIntosh et al., 2009). However, these studies did not take into account "uplifts", which are thought to act as a protective factor against the negative effects of hassles (Kanner et al., 1987; Sin & Almeida, 2018). The relationship between hassles, uplifts, stress, and depression is illustrated in The relationship between hassles, uplifts, stress, and depression is illustrated in .

Figure 4

Model Showing Relationship Between Hassles, Uplifts, Stress and Depression



Risk Factors for Depression

Several other factors can contribute to the development of depression. Since depression is a highly debilitating condition and involves a broad range of symptoms, depression has been studied from multiple theoretical approaches, including biological risk factors such as genetic risk, familial transmission, and sleep dysregulation. Psychological factors have also been considered, including cognitive schemas, negative explanatory styles and beliefs, and interpersonal risk factors such as attachment, parenting styles, and relationship issues (Dobson & Dozois, 2011). It is beyond this thesis to expand on all these perspectives; however, variables that can be objectively measured, such as gender or age, will now be discussed in the context of the general population and athletes.

Gender

Gender can be a significant risk factor in the development of depression (Piccinelli & Wilkinson, 2000). In 2021, females in NZ were 58% more likely to be diagnosed with depression than males (Ministry of Health, 2022). Globally, the prevalence of depression in females was 5%, and in males, 3.3% (Institute of Health Metrics and Evaluation, 2021). There are mixed opinions on whether the gender of an athlete impacts the risk of depression. Several studies concluded that female athletes are at an increased risk of developing depression symptoms (Golding et al., 2020; Junge & Feddermann-Demont, 2016; Kuettel et al., 2022; Purcell et al., 2020; Schaal et al., 2011). For example, Kuettel et al. (2022) in a sample of 587 Danish athletes, found that twice as many females compared to males were deemed high risk for depression, citing multiple factors (e.g., hormonal, cultural factors, inequality) as pathways to gender differences. This finding was confirmed in the meta-analysis by Golding et al. (2020). However, other studies have shown no difference between male and female athletes (Nixdorf et al., 2013; Poucher et al., 2021), including the NZ study by Beable et al. (2017). In saying this, it would be worth considering an athlete's gender when looking at overall risk.

Age

The age of the individual plays a role in the prevalence of depression. Individuals under 25 or over 45 years of age have a higher incidence of depression than other age categories. Furthermore, ages 18-24 have shown the largest increase in depression (from 10.7% to 19.2%) in the last 10 years (Ministry of Health, 2022). The typical age of elite athletes tends to overlap with the peak ages for the risk of mental health disorders (Gulliver et al., 2012). From the researcher's knowledge, within NZ, there are very few elite athletes over the age of 45; however, equestrian athletes tend to be older (Pugh & Bolin, 2004). Some studies have found no difference in depression rates between age groups (Golding et al., 2020; Jensen et al., 2018; Kuettel et al., 2022) others have shown age to be associated with mental illness (Akesdotter et al., 2020; Beable et al., 2017; Gulliver et al., 2015). The

study conducted by Beable et al. (2017) of 187 NZ elite athletes found that athletes younger than 25 had an increased probability of experiencing moderate depressive symptoms. At younger ages, athletes are managing life transitions, such as finishing high school, while also managing sport transitions such as moving from junior to senior competition, which may explain the higher rates of depression (Akesdotter et al., 2020).

Ethnicity

The relationship between ethnicity and depression is multifaceted. While depression can affect people of all ethnicities, it has been shown to affect some more than others. NZ is a multicultural country, with indigenous Māori comprising 17.1% of the NZ population (Stats New Zealand, 2021). However, over the last 10 years, there has been a sharp increase in the diagnosis of depression in Māori versus non-Māori. Māori are 1.6 times more likely to develop depression than non-Māori and Māori women are 1.3 times more likely to be diagnosed with depression than non-Māori women (Ministry of Health, 2022). Similarly to Māori, Pacific peoples, who most commonly identify as originating from Samoa, the Cook Islands, Tonga, Niue, Fiji, Tokelau or Tuvalu, are 0.46 times more likely than non-Pacific people to develop depression (Ministry of Health, 2022). A recent study investigating the mental health and distress levels among athletes in these Pacific counties saw 45% meet the cut-off criteria for depressive symptoms using the Center of Epidemiologic Studies Depression Scale (Neumann et al., 2022). To tackle the elevated rates of depression seen in specific communities, ongoing research is dedicated to creating mental health support methods that consider distinct cultural and social elements that may impact a person's mental health and overall wellbeing.

Familial and Genetics Links

Some theorists (e.g., Sullivan et al., 2000; Wray et al., 2018) argue that depression is a familial disorder with strong genetic influences. Genetics have been shown to play an important role

in the development of depression, as seen by family, twin and adoption studies. A meta-analysis by Sullivan et al. (2000) showed evidence of aggregation of major depression in family members and first-line relatives compared to comparison subjects. It was estimated that recurrent depression had a 37% heritability component. The characteristics of recurrent depression include early onset (under 30) and a high degree of recurrence. Although it seems likely that there is a genetic component to the aetiology of depression, psychosocial factors make this a complex area to study (Malhi et al., 2000).

Stigma

The stigma attached to depression can discourage athletes from speaking out about their struggles, despite the similarity of the rates of depressive symptoms experienced by athletes and the general population (Gulliver et al., 2012). It presents a major challenge to seeking treatment, potentially resulting in additional risks for this group (Gulliver et al., 2012). According to Schwenk (2000) the stigma surrounding depression in the athlete population is often the outcome of behaviour designed to project an image of "mental toughness," or the avoidance of being viewed as weak, ultimately discouraging help-seeking.

Research using focus groups concluded that stigma was the largest barrier to seeking help (Gulliver et al., 2012) and was also identified in a student population (Watson, 2005). Clinicians may need to reframe treatment in terms of “performance help” if an athlete engages in the process of seeking help (Glick et al., 2012). Once engaged, athletes are potentially well suited to psychotherapy, such as cognitive behavioural interventions, as structured processes, including goal setting and homework, are similar to how athletes operate within the sport (Wolanin & Cohn, 2021).

Bi-directional Relationship

Up to this point, there has been a focus on the relationship between stress and health. However, it’s important to highlight that this relationship can be bi-directional. Other models of

psychotherapy e.g., the Cognitive Vulnerability-Transactional Stress Model, (Hankin & Abramson, 2001) postulate that depression can generate stress. For instance, depression can worsen an individual's cognitive vulnerabilities, thereby increasing their stress levels and creating further stress (Alba & Calvete, 2019). As has been shown, depression is a heterogeneous disorder with multiple causes, and it is highly likely the relationship works bi-directionally.

Summary

Various theories and conceptualisations have emerged in an attempt to understand the origins and effects of stress, given its widespread prevalence. Regarding stress and its relationship to health, some theorists have posited that even minor events or hassles can have as much of a negative impact on health as major life events. Depression is a common negative consequence of stress. Research has found that hassles, in conjunction with other risk factors, can contribute to increased stress, thus increasing the likelihood of depression.

Chapter 3:

Elite Athletes: Stress and Depression

Introduction

Elite athletes face unique stressors, which can take a toll on their mental health and wellbeing. In addition to physical stressors, athletes must navigate multiple psychological stressors such as selection for teams, public scrutiny of performances, and financial stress; all typically at an age where multiple life transitions occur. A model for understanding how these stressors can impact athletes as well as the common stressors athletes face will now be discussed.

Meta-Model of Stress

Fletcher and Fletcher (2005) expanded on the TMSC proposed by Lazarus and Folkman (1984) and developed a framework specifically designed to investigate the relationship between stress and the environment in sport. This framework, known as the meta-model of stress, is presented in Figure 5. The stress-environment relationships are mediated by the processes of perception, appraisal, and coping. As a consequence, an athlete can experience positive or negative responses, feeling states and outcomes (Fletcher & Fletcher, 2005). The meta-model of stress highlights the relationships between stress, emotion, and performance, which can inform effective strategies for helping athletes manage stressors and may explain why athletes respond differently despite being confronted with the same stressor.

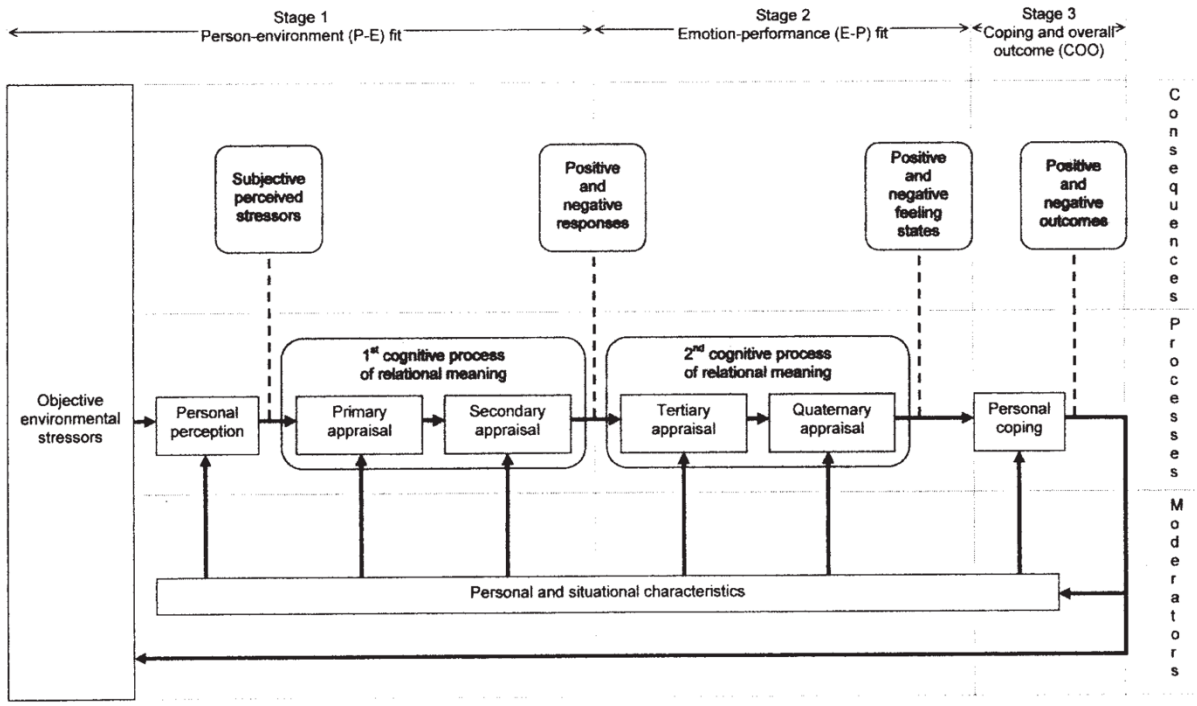
Sport - Specific Stressors

The complexities and challenges of being an elite athlete are immense and multi-faceted (Hanton & Mellalieu, 2006). Although the TMSC emphasises the relationship between the person and their environment, by focusing on the stressors impinging individuals' functioning, researchers can understand the dysfunctional responses and the consistent stressors among the population of

interest – elite athletes (Sutherland & Cooper, 2000). Typically, most studies exploring stressors faced by elite athletes have focused on competition-induced stress (e.g., Feltz et al., 1992); however, in reality, stress triggered by competition is only a small portion of the overall stressors athletes are experiencing (Noblet & Gifford, 2002).

Figure 5

Meta-Model of Stress



Note: Reproduced from Fletcher and Fletcher (2005). A meta-model of stress, emotions and performance: Conceptual foundations, theoretical framework, and research directions. *Journal of Sports Sciences*, *23*(2), 157-158. Copyright 2023 by the Copyright Clearance Center RightsLink

Arnold and Fletcher (2012) identified that athletes could face up to 640 distinct stressors from a range of domains. Stressors have been classified into five categories: (i) leadership and personnel stressors (e.g., coach–athlete relationships); (ii) external expectations (e.g., support staff, media and governing bodies); (iii) cultural and team stressors (e.g., teammates' behaviour, personalities, and attitudes); (iv) cultural norms and goals (e.g., logistics and environmental stressors such as weather, rules and regulations, travel and accommodation); and (v) performance and

personal stressors (e.g., finances and career transitions) (Arnold & Fletcher, 2012). These examples start to give an insight into the breadth and complexity of stressors elite athletes reckon with.

Regardless of the sport, elite athletes often face a range of common stressors. In recent years, research has expanded to explore sources of stress beyond the traditional focus on competition (McKay et al., 2008). This shift in focus has been recognised by organisations such as the International Olympic Committee (Reardon et al., 2019a). The next section will explore these and other common stressors faced by athletes.

Injury

Managing injuries, as well as injury prevention, can be a significant source of stress for athletes (Putukian, 2014; Putukian, 2016). HP sport involves unique physical demands, including heavy training volumes, tedious and repetitious exercise, intermittent or continuous bursts of all-out effort, and contact with opponents or exposure to other physical hazards (Wiese-Bjornstal, 2010). These physical risk factors, combined with numerous psychological factors such as committing to challenging goals, maintaining the mental fortitude to push physical limits, hypervigilance, anxiety/ worry, low mood, risk-taking, poor body image, perfectionism, and life stress (Reardon et al., 2019b) further increase the risk of injuries. In addition, sociocultural factors such as the expectation to be "tough" and play through pain (Murphy & Waddington, 2007), organisational stressors (Arnold & Fletcher, 2012), coaching quality, and culture (Johnson & Ivarsson, 2011) can add yet another layer of risk. Prolonged stress caused by injuries alone can also lead to depression symptoms (Lebrun et al., 2018). The aetiology of elite athletes sustaining injuries can be complex and dynamic, and accordingly, close monitoring to prevent injury should reflect this (Ivarsson et al., 2014).

Transitions

Scientific evidence has suggested that the transition away from elite sport can be challenging. Multiple factors, including a lack of career planning, decreased physical activity,

dissatisfaction with body image (Papathomas et al., 2018), strong athlete identity, post-sport unemployment, career dissatisfaction (Schuring et al., 2017), chronic pain and involuntary retirement (such as deselection) (Wippert & Wippert, 2008), and involuntary retirement due to injury, (Arvinen-Barrow et al., 2017) can be associated with increased risk of mental health symptoms and disorders (Knights et al., 2016; Sanders & Stevinson, 2017; Stoltenburg et al., 2011). Furthermore, athletes who partake in contact sports such as football and rugby may face ongoing neurological effects from concussion (Guskiewicz et al., 2005; Guskiewicz et al., 2007; McCrory et al., 2013) that can lead to significant challenges post-retirement.

Pressure to Perform

Pressure is an inherent part of participating in competitive sport, and typically, it intensifies with higher standards of competition (Hanton et al., 2005). Pressure, as defined by (Baumeister & Showers, 1986), is "the presence of situational incentives for optimal, maximal, or superior performance" (p. 362). Elite athletes must manage external and internal pressures to perform, otherwise it may expose them to risk factors for depression (Puffer & McShane, 1992). For example, it is common practice for media outlets to predict results leading up to the Olympic Games; this pressure is just another external stressor that athletes must manage (Heaviside et al., 2018). Internal pressure, such as goals and expectations based on past performances, can become burdensome for some athletes, adding to the stress, especially prior to pinnacle events (Hanton et al., 2005; Mellalieu et al., 2009).

Sport Type

The sport an athlete competes in may be associated with increased stressors. Individual versus team sports present different sets of circumstances that can act not only as risks, but also as protective factors. To simplify research outcomes, athletes have tended to be classed as either playing a sport as an individual or as part of a team, rather than broken down by sport type such as

football or swimming. Nicholls et al. (2007) found that athletes participating in team sports faced different stressors than those that affected individual athletes, such as selection worries or letting teammates down. However, being part of a team, and the social support that can come with it, can be protective against the development of mental health challenges. A systematic review by Gariepy et al. (2016) concluded that social support across all age ranges was protective against depression.

In contrast, individual athletes report more stressors associated with increased training time and relationships with their coach. Various studies have investigated whether differences exist in the prevalence of depression in athletes who compete as individuals or team sport athletes. Some studies (Beable et al., 2017; Nixdorf et al., 2016; Nixdorf et al., 2013) concluded that individual athletes were more susceptible due to higher levels of social isolation and a tendency to internalise performances. Other research has found no differences (Kuettel et al., 2022) between sport type and the development of depressive symptoms. However, differences may lie in how athletes are categorised; for example, in the study by Beable et al. (2017), a member of a rowing eight team was classified as an individual athlete as it was perceived that they operated on more of an individual basis. In contrast, Nixdorf et al. (2013) categorised athletes as either competing on their own as individuals or competing with another person or group, as a team. If the athlete did both, they were categorised as such. However, being able to identify these differences across sports types could be valuable in determining prevention efforts (Tahtinen et al., 2021).

Relocation

It is common practice for athletes pursuing an elite sporting career to relocate and be based at their national hubs or closer to their coach. On the one hand, relocating for sports should make accessing training and sport-specific services easier; however, being away from home and/or family can also put athletes under more stress (Beable et al., 2017). For many athletes, families can play a significant role in helping facilitate tasks associated with sporting endeavours and are considered an important part of their success (Burns et al., 2022). In a meta-analysis by (Gariepy et al., 2016),

emotional support from spouses, followed by family and friends, was seen as most consistently associated with protection from depression in adults. However, in an Australian sample where over 40% of athletes had moved away from home for their sport, relocation did not predict the level of depression symptoms (Gulliver et al., 2015). Conversely, in a sample of NZ athletes, relocation or centralisation was associated with increased stressors (Beable et al., 2017). This is an area that should be further investigated.

Corona Virus Disease 2019

While perhaps a once-in-a-lifetime stressor, Corona Virus Disease 2019 (COVID-19) had widespread impacts on athletes globally (Carnevale Pellino et al., 2022). Aside from the implications that lockdowns had on athletes concerning training, COVID-19 affected the mental health of young people more than older people (Racine et al., 2021). NZ athletes faced one of the world's strictest lockdown regimes, which saw athletes unable to use domestic training facilities such as gyms and swimming pools (Cousins, 2020). In addition, all domestic and international sport ceased, including the postponement of the 2020 Olympics in Tokyo (Hamilton et al., 2020). As a result of these disruptions, athletes encountered stressors such as “social isolation, career disruption, qualification process uncertainty, and unconventional and limited access to effective training environments and training partners” (Schinke et al., 2020, p. 2).

While there is no NZ data on how elite athletes coped during COVID-19, a review by Pellino et al. (2022) showed that athletes may in fact, have coped better than the general public during lockdowns. Furthermore, a Canadian study tracked athletes’ mental health over the course of the pandemic and concluded that although symptoms of depression were prevalent at baseline, they did not change over this period (Poucher et al., 2021). However, it may be hard to compare athletes as each country approached the pandemic quite differently; for example, Kiwis returning to NZ between March 2020 and January 2022 had to comply with a mandatory 2-week hotel quarantine, adding extra burden to NZ elite athlete's (Long, 2020, November 4).

Sleep

The importance of sleep is well documented within athlete populations. Thun et al. (2015) showed that sleep deprivation was negatively associated with performance, while sleep extension improved performance. A study of Olympic athletes during Olympic preparation by Drew et al. (2018) concluded that one in two Olympic athletes would be classified as 'poor sleepers', especially before an important competition (Juliff et al., 2015). Multiple sport-specific factors can contribute to poor sleep. Early starts to meet set training times can mean reduced sleep (Sargent et al., 2014), with late-night competitions having a similar impact (Sargent & Roach, 2016). Thoughts about competition and nervousness are associated with reduced sleep (Juliff et al., 2015), and training intensity has also been said to decrease sleep (Killer et al., 2017; Lastella et al., 2015). Athletes require more sleep than the general population, but various factors can disrupt their sleep patterns. While the exact mechanisms are not yet fully understood, insufficient sleep can increase the risk of depression significantly. One potential explanation for this is that inadequate sleep leads to daytime fatigue, which has been shown to be a predictor of depression (Zhai et al., 2015).

Elite athletes encounter not only sport-specific stressors but also the same life stressors as their non-athlete peers. The meta-model of stress (Fletcher & Hanton, 2004) helps understand how athletes react to stressors in their own unique ways. By identifying common stressors, those working with athletes can instigate educational programs to better prepare athletes and improve resilience. Deeper insight into these stressors is pivotal for supporting elite athletes.

Rates of Mental Health Disorders in Elite Athletes

The idea that elite athletes are immune to mental health challenges is now widely discredited. Research on the mental health of elite athletes aligns with global trends of increasing mental health awareness. Position statements in regard to elite athletes' mental health by organisations such as the International Olympic Committee (Reardon et al., 2019a) reflect this growing awareness. As discussed, athletes are a unique population and face a range of general and

sport-specific stressors that can impact their mental health (Arnold et al., 2017; Küttel & Larsen, 2020; Wolanin et al., 2015). Recognising the uniqueness of this population and how being an elite athlete may increase the risk for a mental health disorder compared to non-athletes has become increasingly important.

The extent of mental health issues and symptoms in elite athletes remains a topic of ongoing debate. A meta-analysis by Gouttebarge et al. (2019) showed that the prevalence of mental health symptoms and disorders in elite athletes ranged from 19% for alcohol misuse to 34% for anxiety/depression for current elite athletes and 16% for distress to 26% for anxiety/depression for former elite athletes. Recent research on a Canadian elite athlete population concluded that 41.4% met the cut-off criteria for one or multiple mental disorders (Poucher et al., 2021). Athletes have been found to experience higher rates of mental disorders than the general population (Gorczynski et al., 2017).

Depression in the Elite Athlete Population

Recently, the media have spotlighted the growing recognition of depression within the athlete community (Nimmo, 2021, August 11). As a result of athletes speaking publicly about their mental health challenges (specifically depressive symptoms), there has been an increase in research investigating the prevalence. A recent systematic review concluded that the prevalence of depressive symptoms ranged from 6.7% to 34% across 16 studies meeting the criteria for inclusion (Gouttebarge et al., 2019). In addition, a systematic review by Golding et al. (2020) compared 16 studies using the same depression measure (The Center for Epidemiologic Studies-Depression) and indicated that one in four elite athletes may be experiencing depression. More recently, a Canadian study (Poucher et al., 2021) recorded a 31.7% depression symptomology, which suggested a higher prevalence rate in athletes compared to the Canadian general population rates. In a Danish sample of 587 elite athletes from 18 sports, 24.9% experienced moderate to severe depressive symptoms; however, this study also included youth athletes (Kuettel et al., 2022). Closer to home, in an

Australian sample of 1566 elite athletes, severe depression was lower than published community norms; however, 9.5%-17.7% reported high to very high levels of distress (Purcell et al., 2020). It is apparent that depressive symptomology is prevalent in the elite athlete population (Gordon, 2018; Gregory, 2021; John, 2019, January 27).

While this study is focused on elite athletes, it assists our understanding to look beyond the realm of HP sport. The NZ population rate for depression, as seen in the latest (2020/21) NZ Health Survey, was 19.3%, (Ministry of Health, 2022); however, during the pandemic, this increased to 31% (Gasteiger et al., 2021). In comparable groups with similar age ranges, a meta-analysis of depression in medical students showed a rate of 27.2% (Rotenstein et al., 2016). Within NZ, 16.9% of medical students experienced clinically significant depression (Samaranayake & Fernando, 2011). These statistics provide insight into how elite athletes in NZ measure up against other cohorts.

Suicide in Elite Athletes

The notion that athletes are expected to be "mentally tough" is deeply ingrained, which is why instances of athlete suicide can have a significant impact (Bauman, 2016). Media reports of prominent athletes who die by suicide broaden and magnify the impact of these deaths (Dabelea & Klingensmith, 2008; The Associated Press, 2012; Thorpe, 2021) but equally, raise awareness of wellbeing. Researchers have begun asking whether athletes are at the same, greater, or lesser risk of suicide than their non-athlete peers (Webner & Iverson, 2016).

Studies of athlete suicide are limited; however, it has been considered in a few studies. A study of 5,389 retired Italian professional soccer athletes concluded the rate of suicide was no different to that of the Italian general population (Taioli, 2007). Additionally there has been a lot of focus on the attribution of chronic traumatic encephalopathy and/or concussion to athlete suicide. A number of population studies have showed lower rates of suicide in retired National Football League (NFL) players compared to age- and gender-matched peers (Russell et al., 2020). Studies reinforce the notion that the causes of suicide are diverse, and often multi-factorial (Webner &

Iverson, 2016). The untimely death of NZ's elite cyclist Olivia Podmore in 2021 from a suspected suicide (Thorpe, 2021) underscores the urgency and significance of research on this topic.

Summary

The focus of this chapter centres on the heightened concern regarding elite athletes and the environments in which they function. Studies demonstrate that the incidence of mental health difficulties among athletes is as prevalent, if not greater, than that in the broader populace. Of particular concern, athlete suicide often stems from depression symptomatology. There is growing public recognition of the unique challenges faced by elite athletes. Consequently, there is an upsurge in the need for research within this population in order to support this cohort better.

Chapter 4: Aims and Rationale for the Current Study

The objectives of the current study were to improve our understanding of the relationship between hassles and depression symptoms in NZ elite athletes and to identify which elite athletes may be at increased risk of hassles or depression, or both. To enable these objectives to be achieved, a follow-up study was completed based on a 2015 study of NZ elite athletes (Beable et al., 2017). The findings from the 2015 study informed a new mental health strategy implemented by HPSNZ; it is hoped that findings from the current study will be used to update this strategy.

Original Study Findings

In 2015, research on the mental health of elite athletes was scarce, and a study of this nature had never been undertaken. For clarity, the data in the study were collected in 2015, but not published until 2017. The study produced several interesting findings. The three most frequent daily hassles were “troubling thoughts about their future” (74.9%), followed by “concerns about meeting high standards” (73.2%) and “concerns about not getting enough sleep” (59.8%). The study identified 20.9% of participants (even split of male and female) as experiencing moderate symptoms consistent with depression (cut-off ≥16), while 8.6% of those scored above the cut-off score of 22, reflecting possible symptoms consistent with major depression. Athletes considering retirement and playing individual sports were significantly associated with moderate symptoms consistent with depression. Those participating in individual sports were 4.2 times more likely than team sport athletes to be experiencing depression symptoms. Moreover, those undecided about retirement were 9 times more likely to experience depressive symptoms and 4 times more likely than those who had decided to retire.

Females who were (i) exhibiting depression symptoms, (ii) competing in individual sports, and (iii) had moved away from home for their sport experienced an increased number of hassles and increased severity in terms of how they experienced the hassles. Furthermore, those athletes

showing symptoms of depression experienced, on average, 17 more individual daily hassles. Athletes who had part-time jobs also had higher severity of hassles scores than those who were unemployed.

Study Hypotheses

Hypothesis 1: Females will experience higher rates of moderate symptoms consistent with depression compared to males.

Hypothesis 2: Overall rates of symptoms consistent with depression in NZ elite athletes will have increased since 2015.

Hypothesis 3: Participants under 25 years of age will experience higher mean levels of symptoms consistent with depression than athletes above 25 years of age.

Hypothesis 4: Participants who compete as individuals compared to those competing in a team will have higher mean levels of symptoms consistent with depression.

Hypothesis 5: Frequency and severity of hassles will be significant predictors of symptoms consistent with depression.

Chapter 5: Methods

Introduction

This chapter will discuss the research method used in this study. First, the organisations that partnered with this study and their roles will be explained for clarity. The research design, ethical considerations, risk assessment procedures, and participant recruitment strategies are considered next. Finally, the various instrumentation that were used will be outlined, and the method of data analysis will be explained.

High Performance Sport New Zealand

High Performance Sport New Zealand (HPSNZ) is responsible for monitoring and tracking the performances of athletes and teams, as well as providing expert advice to National Sports Organisations (NSOs) on the allocation of their funding. The organisation also employs its own team of experts and practitioners to work with coaches and athletes to improve their performances. HPSNZ staff and support personnel are mainly located at the organisation's primary hubs in Auckland, Cambridge/Karapiro, Wellington, Christchurch, Wanaka, and Dunedin.

HPSNZ seeks to undertake research within the population to assist and nurture athlete wellbeing. The organisation recognises the significance of athlete wellbeing and firmly believes that it can improve performance (McCarthy, 2011). As a result, HPSNZ has established a Performance Life Team to assist athletes in incorporating career planning into their athletic objectives. Moreover, the organisation employs a group of psychologists who are available to assist athletes experiencing mental health challenges.

National Sports Organisations

Each sport in NZ has a governing body responsible for overseeing its day-to-day operations, which includes the management of its HP sports program. The funding for these programs is

primarily provided by the government through HPSNZ. While some sports (e.g., Rugby) secure significant sponsorship deals and do not rely on HPSNZ funding, most depend on financial assistance from HPSNZ. To foster a cooperative working relationship between HPSNZ and NSOs, Performance Team Leads (PTLs) employed by HPSNZ act as links between the two organisations. This study involved 14 different NSOs: Athletics NZ, Canoe Slalom NZ, Cycling NZ, Canoe Racing NZ, Equestrian Sports NZ, Hockey NZ, Netball NZ, Paralympics NZ, Rowing NZ, Rugby NZ, Triathlon NZ, Snow Sports NZ, Swimming NZ, and Yachting NZ. This group of sports mirrored those sampled in 2015.

Research Design

The purpose of this study was to investigate and compare the impact of hassles on the mood of elite athletes in NZ, and to assess the rate of depressive symptoms. Additionally, the study aimed to identify potential risk factors associated with these symptoms. The aim of a comparison study is not only to illustrate the differences between populations but also to "establish some measure of significance on the observed difference" (Yee & Niemeier, 1996, p. 1). To make comparisons between the two studies, the same study design that researchers used in 2015 was employed. The methods and procedures used are now described.

Cross-Sectional Research Design

This study employed a cross-sectional design, with data being collected at one point in time. Cross-sectional research is considered an observational study, as no intervention is carried out, and researchers are simply observing subjects and are primarily interested in the prevalence (Mann, 2003). An experimental design that required a sample group of athletes to participate in an intervention may have been fraught with complications and difficulties; for example, requiring athletes to be in one place to receive an intervention over multiple weeks may have been impossible to arrange logistically. A cross-sectional study allowed for anonymous data to be collected relatively easily.

There are many advantages to undertaking a cross-sectional study. One advantage of this type of study is when gaining ethical approval. Subjects are not deliberately exposed, treated, or not treated, so this type of research limits the burden and potential risks to participants. Furthermore, it is cost-effective; there are no follow-ups and fewer resources are required to run this type of study (Mann, 2003). In addition, these types of studies are less affected by attrition or participant dropout, as participation involves a one-off contribution, unlike cohort studies (Gustavson et al., 2012). Cross-sectional studies are an effective way to determine the rate of health disorders such as depression, as in this study (Mann, 2003).

A disadvantage of this type of research is differentiating cause and effect from simple association (Mann, 2003). For example, this research looks at the relationship between stress and mood. However, it is impossible to determine the direction of causality (i.e., does high stress cause low mood, or does low mood lead to elevated stress). Being unable to determine causal effect is one disadvantage of cross-sectional research (Creswell & Creswell, 2018). However, this study design allows inferences about the relationships between variables and therefore how they compare to the findings in 2015.

Longitudinal Research Design

Although this was a cross-sectional study, the researchers were fortunate that it was a repeat study and could compare data previously collected 2015 by Dr Sarah Beable and HPSNZ. The data were collected from HP athletes, but not from the participants who took part in the 2015 study. Because it had been 7 years since the original research was conducted, it was not possible to conduct true longitudinal research as many of the participants may have retired. Therefore, new participants were required to compare the two studies. If the study were to be conducted a third time, it could be considered a repeated cross-sectional study design according to Yee and Niemeier (1996).

Survey Design

To gather quantitative data and therefore describe trends within this population, a survey design was implemented. This method is cost-effective to build, easy to administer to many people, and has a rapid turnaround from data collection to analysis (Creswell & Creswell, 2018). The online survey for this study used the QualtricsXM software platform to host the survey and record responses. An online survey makes it easy to send to large groups of people who meet the criteria, and the QualtricsXM software records the responses. This survey could be accessed via computer as well as smartphones; a Quick Response (QR) code was created for easy access to the survey on smartphones and used on marketing material (see Appendix A).

Blocks of items in the survey were displayed using an interactive multiple-page delivery (Bickman & Rog, 2009), and once answered, the respondent could move to the next page. A pop-up screen informed respondents if they had failed to answer any items and encouraged them to reconsider (DeRouvray & Couper, 2002); however, either way, they could move on. A progress bar indicating how far through the survey the respondent was, showed below the questions. It is presumed that respondents are more likely to finish a survey if they are updated about their progress (Conrad et al., 2010). When the respondent completed the survey, they could press "submit" and enter the prize draw, which separated personal information to maintain confidentiality.

Ethical Considerations

Massey University Ethics Approval

A human ethics risk assessment application was submitted. Full ethics approval was obtained on 9 June 2022, for 3 years.

High Performance Sport New Zealand Ethics Approval

Along with the Massey University ethics process, ethical approval from HPSNZ was also required. The study was presented to the HPSNZ research advisory group on 11 May 2022 (see Appendix K). The research overview, objectives and timeline were presented by the principal researcher and permission to approach NSOs to recruit participants was granted. HPSNZ required a copy of the Massey University ethics approval and a report of the findings (see Appendix D).

Cultural Consideration

The focus of this study was on athletes generally; however, ethnic demographic information was obtained (see Appendix E, question 60). Before including a question on ethnicity, a cultural consultation took place with Dr Pita King of Massey University, which helped to identify areas of concern around challenges and assumptions that are often made. Furthermore, data storage and how research findings relating to depression within a Māori athlete population would be interpreted were discussed. As Dr Pita King was not a clinical psychologist, further consultation with Associate Professor Mathew Shepherd (Massey University) who is a clinical psychologist, and a Māori mental health expert was sought. Ethnic identity information was collected for demographic purposes only and was not used for comparative analysis.

Conflict of Interests

Possible conflicts of interest within this study existed. The lead researcher is a retired Olympic athlete (yachting) who participated in the original study and personally knows some participants who would be included in the study frame. In addition, the co-supervisors, Dr Bruce Hamilton, Dr Kylie Wilson, Dr Sarah Beable, and Dr Warrick Wood, have all worked in various capacities with athletes who would be included in the study frame. Considering the nature of HP sports, it was improbable that anyone in the supervision team would lack connection to at least one

participant. It was decided that this did not create any bias in completing the study. The lead researcher's primary supervisor had no conflict of interest in this study.

Confidentiality and Anonymity, Data Storage, Consent

Participation in this study was voluntary and anonymous. The raw data was kept in a password-protected file, with only the lead researcher and supervisor able to access it. No identifying information was included in the survey. Maintaining confidentiality and anonymity was reinforced to participants in all correspondence. Consent to participate was sought at the beginning of the survey.

Risk Assessment

When investigating a mental health disorder such as depression, the nature of some questions may provoke feelings of discomfort. In order to provide assistance to participants and minimize the risk of causing discomfort, multiple measures were implemented. One of the prerequisites for joining this study was that the athletes must qualify (via their NSO) for either psychology support services or the Instep Employee Assistance Program. This essentially made it mandatory for them to have access to a trained mental health professional to be able to participate in the study.

Support Services Available to Participants

An information sheet (see Appendix F) addressed topics such as confidentiality and use of data and discussed the possibility that some questions might invoke uncomfortable feelings or distress. Following this, information was provided for participants on how they could access support if they were experiencing any distress. The options for support included confidential and non-confidential options. For example, if an athlete was happy to disclose their name, they could contact their NSO doctor, HPSNZ doctor or team psychologist or any member of the research team. If an

athlete wanted to remain anonymous, they had the option to contact the Instep EAP program, or a list of support helplines (see Appendix L). The list of support options was stated at the beginning of the online survey, part way through following the depression measure, and at the end of the survey.

Contacted the Research Team

The information sheet (see Appendix F) offered the ability to contact any of the research team with any questions or concerns. Aside from the principal researcher, the research team consisted of a clinical psychologist, two sports physicians, a mental skills consultant, and a Massey University lecturer in sport and exercise psychology, all of whom were equipped to manage athletes who may have been in distress. The principal researcher had no professional experience working with distressed athletes.

As the principal researcher was a retired athlete and may have been known to some of the participants, the research team ensured the researcher was equipped with a protocol to follow if a distressed athlete contacted them. The entire research team convened a meeting and developed a plan (refer to Appendix G). The document outlined the recommended course of action to follow if an athlete reached out to the principal researcher through either phone or message, based on the level of distress. Additionally, the document included a list of the contact phone numbers of the research team and other available support methods.

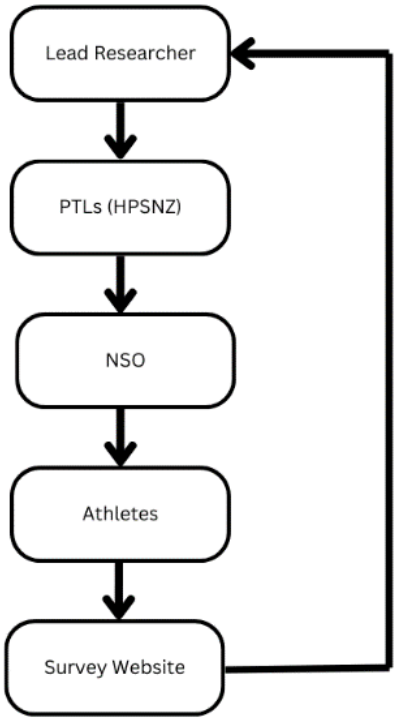
Participant Recruitment

The NSO facilitated the recruitment of eligible athletes for the study. Figure 6 shows the process, which adhered to already formed lines of communication. Furthermore, a presentation was made by the lead researcher, Dr Bruce Hamilton, and Dr Kylie Wilson to the PTLs, and the Chief Executive Officer of HPSNZ to outline the research aims (see Appendix M). To assist NSOs, the lead researcher formulated an information document, which included an email template that could be used to recruit athletes (see Appendix H). It was agreed that the NSO had a broader understanding

of the training and competition schedules of eligible athletes and, therefore could time the survey invitations informed by this knowledge.

Figure 6

Participant Recruitment Process



Advertisement

Most of the participant recruitment was achieved via direct emails from NSOs to athletes. These emails included the study poster and a promotional video (see Appendix I). The same study poster was displayed in the HPSNZ training hubs (see Appendix A). In addition, the researchers looked to raise general awareness of the study by having it featured in the monthly HPSNZ news email (see Appendix J), which went to all HPSNZ subscribers.

Participant Incentive

After completing the survey, the participant could enter a draw to win one of 10 x $40 fuel vouchers. Contact information was collected, but this information could not be linked to their survey

data. To ensure the lead researcher never saw the list of participants, an internet specialist at Massey University, who was responsible for building the online survey, performed the prize draw.

Instrumentation

Validated psychological measures were implemented for this study. To supplement these measures, some specific research questions were implemented for this study. A full list of items is included in Appendix E. A full copy of the Daily Hassles Scale (DHS) has not been included in this thesis due to copyright laws.

Demographic Questions

The survey started with demographic questions; these were categorical to help protect the identity of individuals (i.e., age groups rather than asking age outright). Gender, age, ethnicity, employment status and what sport the athlete participated in were gathered. In addition, participants were asked if they had participated in the 2015 study; if this group of athletes was large enough, an analysis could see how they compared.

General Health and Sport-Specific Items

A series of questions was posed based on evidence of elite athletes' risk factors for mental health challenges. These questions covered several topics, including previous diagnosis of depression, antidepressant use, recent injuries, concussions, surgeries, family history of mental illness, substance or alcohol concerns, eating disorders, retirement decisions and whether the athlete had to relocate away from home to continue pursuing their sport (see Appendix E).

Measures

The Center for Epidemiologic Studies Depression Scale Revised. The Center for Epidemiologic Studies Depression Scale (CESD) was created by Radloff (1977) and then revised

(CESD-R) by Eaton et al. (2004). Both scales were designed to be used in epidemiologic surveys in community settings rather than at an individual level. The revision reflects modern diagnostic criteria and the nine primary symptoms of MDD and includes a response category of "nearly every day for two weeks". Items pertain to depressed mood, sadness, thinking/concentration, loss of interest, appetite, sleep, guilt/worthlessness, movement/agitation, tiredness/fatigue, and suicidal ideation. For example, respondents were asked to respond to statements such as "my appetite was poor" or "I could not shake off the blues". The 20-item measure employs a 4-point scale from 0 points (not at all, or less than one day), to 3 points (5-7 days and nearly every day for 2 weeks). Total scores can range from 0 – 60 points, which allows the CESD and the CESD-R to be compared. To remain consistent with the study in 2015, two cut-off scores were employed. A score of ≥16 points reflected possible moderate depression symptoms consistent with depression, while a score > 22 points reflected major symptoms consistent with depression. Scores below 16 points were considered subclinical symptoms consistent with depression (Beable et al., 2017; Eaton et al., 2004; Nixdorf et al., 2013). The current study treated CESD-R scores as continuous.

Psychometric properties were examined by Van Dam and Earleywine (2011) in a study across a large community sample (sample 1, n=7389) and a smaller student sample (sample 2, n=254). Convergent and divergent validity was measured against the Positive and Negative Affect Schedule (Watson et al., 1988), State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA) (Ree et al., 2008) and the Schizotypal Personality Questionnaire—Brief (SPQ-B) (Raine & Benishay, 1995). In both samples, there was a large positive correlation between CESD-R and the STICSA, r = .737 and r = .653, respectively, showing the high comorbidity of anxiety and depression. The CESD-R identified a base-rate depression using the algorithmic classification criteria comparable to a large epidemiologic study of depression (Hasin et al., 2005). The CESD-R showed excellent reliability in 22 studies from 2018 - 2014 (Kimong, 2020) with internal consistency; Cronbach's alpha coefficient of .91 (N=3,438). In the current study, the Cronbach's alpha coefficient was .91 (n = 126).

Daily Hassles Scale. The Daily Hassles Scale (DHS) was created by Richard Lazarus and Susan Folkman based on their work on psychological stress (Lazarus & Folkman, 1984; Lazarus & Folkman, 1987). The DHS consists of 117 items used to collect data on an individual's daily life. During the past month, participants rated how much of a hassle the item was for them, from 0, (none or did not occur) 1, (somewhat severe) 2, (moderately severe) and 3, (extremely severe). For example, "How much of a hassle was having enough money for groceries". The scale investigates everyday challenges across eight domains: future security, time pressures, work, household responsibilities, health, inner concerns (e.g., thoughts about the future), financial responsibilities and neighborhood/ environmental stresses.

Two scores are established for the DHS: firstly, the frequency of hassles (hassle frequency) is the total number of hassles endorsed by the individual without regard to severity, while the severity of hassles (hassle severity) is calculated from the average severity rating of all the items that have been endorsed. Previous research indicated that frequency and severity appear to operate differently. The current study treated the hassles frequency and severity scores as separate continuous variables, with higher scores indicating more hassles and increased severity of those hassles.

The reliability of the frequency and severity scores was tested by Kanner et al. (1981), who collected data and averaged it over a nine-month period. The frequency scores were reliable (α = .79) over this period, however, severity scores were lower (α = .48) and may be due to individuals endorsing different hassles month to month or because severity is more subjective than the frequency of the hassles (Lazarus & Folkman, 1989). In the current study, the Cronbach alpha coefficient was α = .96; however, that should be interpreted with caution as the DHS is concerned with stability over time and reliability reflects one point in time. The DHS offers a representative sample of stressful situations for a given time period; therefore, the scale is said to have a high degree of content and face validity (Lazarus & Folkman, 1989). Kanner et al. (1981) found that hassles scores were strongly related to affective distress and psychological symptoms (r = .34).

Furthermore, (DeLongis et al., 1982) used a measure of somatic health based on findings by the Alameda County Human Population Laboratory (Belloc & Breslow, 1972) as an outcome measure and found hassles score correlations ranged between .30 and .40 depending on the health variable. Young (1987) correlated hassles with the Hopkins Symptom Checklist (HSCL) and found a correlation of r = .43.

Statistical Procedures

Data from the online survey program Qualtrics were exported as a locked zip file to Statistical Package for the Social Sciences' (SPSS) version 22 to be analysed. The data were screened for errors, and exclusion criteria were applied. The statistical procedures for this study were undertaken in three parts. Part one consisted of descriptive statistics for general demographic information, the sport-specific and health questions and the main measures CESR-R and DHS frequency and severity. A chi-squared test was also conducted to compare the current sample demographics to HPSNZ-provided data. Lastly, a Point-Biserial correlation analysis was used to explore the relationships between all variables. Variables with more than two levels of data were dummy coded to be examined.

Part two consisted of testing the hypotheses. Group comparisons using *t*-tests as well as descriptive methods were used. A hierarchical linear regression examined the relationship between hassles and depression, controlling for significant variables. Part three consisted of the exploratory analysis, which combined a comparison analysis and further tests to extend the current study. To compare study findings, the same set of statistical tests was performed. A limitation of this study is that only the published findings and other data personally communicated by the lead researcher were able to be compared, as no access to the raw data was possible. Chi-square tests and multiple logistic regression analysis were used to assess the association between depressive symptoms and age, gender, and other demographic variables. Linear regression analysis was used to explore the association between hassles frequency and severity with variables, including depressive symptoms.

Finally, based on the insights gained from the earlier analysis, it was possible to pursue additional statistical procedures to expand the scope of the current study. A larger sample was created to compare levels of depression, along with looking at the hassles a "depressed group" endorsed. Lastly, a hierarchical multiple linear regression was undertaken to see whether adding significant variables from 2022 could explain more variance in hassles frequency than in 2015.

Statistical Significance and Effect Size, Rounding

An alpha level of $p < .05$ was used throughout this study as a threshold for statistical significance. To complement this, effect sizes were calculated and presented for all significant and non-significant relationships. All statistics have been rounded to two decimal places unless the value is lower than .009. Effect sizes were measured as follows:

Independent *t* tests: Cohen's *d*

Hierarchical and Multiple Linear Regression: R^2

Chi-square Test for Association: Phi ϕ

Cohen's *d* was interpreted using Cohen (1988) guidelines: relationships were classified as weak ($r = .10 \leq .29$), moderate ($r = .30 \leq .49$), and strong ($r = \geq .50$). Correlations less than $r = .10$ were interpreted as having negligible or no relationship.

Power Analysis

Statistical power is the ability of a test to detect an effect if there is one (Field, 2018). Power is determined by significance level and sample size and signifies the probability of obtaining a statistically significant result, conditional on a specific assumed effect size (Tabachnick & Fidell, 2019). Cohen (1988) recommends a .20 probability of failing to detect an effect; therefore, this can be inverted to represent a .80 or 80% chance of detecting an effect.

A post hoc power calculation was undertaken using G*Power 3.1 (Faul et al., 2009). This type of power analysis is used after the sample has been collected and is not as powerful as an *a*

priori power analysis (Drevets et al., 2008). This study used a purposive sampling method, and all efforts were made to have as large a sample as possible; however, the final sample size of 126 was largely out of the control of the research team. We then aimed to understand, with this sample size, what power (1- β) was available for each test.

For the main analysis, the research team considered three primary tests: an independent samples *t*-test, multiple linear regression, and hierarchical linear regression. Performing an independent samples *t*-test with 2 groups, the smallest group consisted of 37 cases: given a sample size of 126, a medium effect size (.40), with alpha level at .05; this returned a beta level of .52. However, using the larger group of 57, and the same effect size and alpha, beta improved to 0.60. With an effect size of 0.50, and a sample of 57, the power increased to 0.79. Multiple regression analysis with a maximum of 5 variables requires a sample size of 91 to detect a medium effect size, with power of .80 and alpha at .05. The current sample size exceeded this sample size requirement (Field, 2018).

Chapter 6: Results

Introduction

This chapter begins with the results of the data screening process and corrections methods, then presents the sample demographics, followed by an analysis of the generalisability of the sample. It then presents the results for the study hypotheses, followed by an exploratory analysis, which includes a comparative analysis and tests undertaken to extend the analysis.

Data Screening

Careful consideration of issues pertaining to the preparation of the data is undertaken in the next section. Decisions must be made before any analysis begins to ensure the accuracy of results. Several types of data errors can occur, leading to inaccurate or invalid responses, or more problematically, data may be missing altogether due to participants skipping questions. Furthermore, computer or software malfunctions can occur, resulting in the participant being unable to finish the survey. In any of these situations, considerations must be made so the outcome does not lead to bias (Field, 2018).

Screening for Errors

The data were screened for any values out of the expected range for each variable, using the descriptive features in SPSS. All responses in the dataset were within the expected data ranges.

Missing Data

Missing data refers to responses to variables that were not available for analysis and is one of the most pervasive problems in data analysis (Field, 2018). How serious the problem is depends on how much data is missing, the pattern of that missing data, and why it is missing (Tabachnick & Fidell, 2019). Strategies to combat respondents skipping or unintentionally missing questions were in

place; however, respondents could still complete the survey with missing data. The pattern of missing data, rather than how much is missing, is important to detect, and if not adequately detected can affect the generalizability of results.

Exclusion Criteria

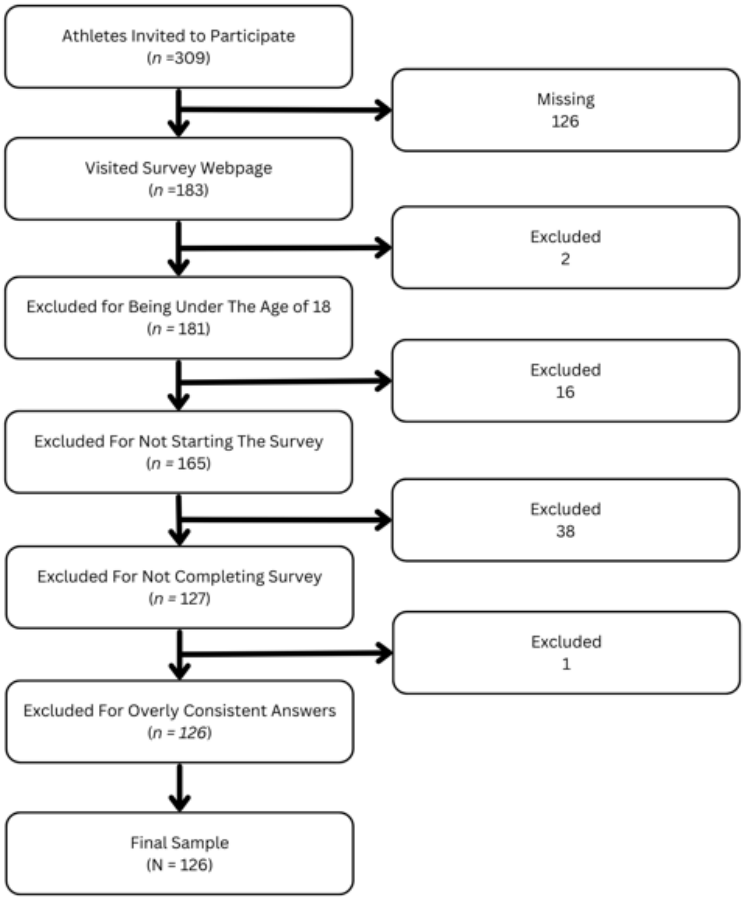
The exclusion criteria for this study were the same as those used in the 2015 study to ensure this study was consistent. The 2015 study only included data from participants who completed the entire survey. Even if one answer on one item was missed, they were excluded. The results of Little's MCAR Test was non-significant ($X^2(1058, N = 133) = 844.08, p = 1.00$), which suggests the data were "Missing Completely at Random" (MCAR); however, to remain consistent with the 2015 study, these cases were also excluded, leaving a total sample of 126 (see Figure 7).

Univariate Assumptions

A mixture of parametric and non-parametric statistical analysis was applied. According to Tabachnick and Fidell (2019), since only one dependent variable was used at any given time, regardless of the number of independent or predictor variables, all of the statistical procedures used in this analysis were considered univariate. A broad discussion of the assumptions that were made about the data is presented; however, any assumptions pertinent to specific statistical tests are discussed in the relevant sections.

Figure 7

Diagram Showing Exclusion Criteria and Final Sample Size for Current Study



Outliers

The presence of an outlier with an extreme value for either a single variable or combined variables can distort statistics and lead to results that do not generalize (Tabachnick & Fidell, 2019). All continuous variables were assessed on a univariate basis, to consider whether there were any extreme values. All values were converted to a standard score and values were considered to be outliers if they exceeded three standard deviations from the mean (Osborne & Overbay, 2004). Inspecting standard scores from the CESD-R, it was apparent that there were two outliers. Consideration was given to the cause in terms of whether the outliers arose from errors in the data, or from inherent variability in the data (Anscombe, 1960). Given that these two outliers were not due to data errors, and the cases concerned did not feature as outliers in other variables, it was

concluded that given the population of interest in many ways did not represent normal individuals, these two extreme scores were representative of the population of interest and should be included in the analysis (Osborne & Overbay, 2004). In addition, it has been shown that outliers due to extreme responding show very little statistical bias (Zijlstra et al., 2011).

The same procedure was completed with hassles frequency and hassles severity scores (DHS Frequency, DHS Severity); raw scores were converted to standard scores and visually inspected for outliers above and below three standard deviations from the mean. All standard scores fell within a range of *SD* = -1.5 and *SD* = 2.7 for the hassles frequency scores; likewise, for the hassles severity scores, all the standard scores fell within the range of *SD* = -1.1 and *SD* = 2.5. It was concluded that there were no outliers for the DHS measure.

Normality of Data

Most of the parametric statistical procedures used to analyse this data require the data to be normally distributed. Screening continuous variables for normality is an important step in any univariate analysis (Tabachnick & Fidell, 2019). Statistical and graphical methods were used to assess the normality of variables. A kurtosis statistic can indicate the level of the data distribution; positive skewness would indicate cases piled up to the left, and negative skewness the opposite. A skewness score can indicate the symmetry of the data, and thus whether the data is normally distributed. To assess distribution, values above zero would indicate a peaked distribution, while those below zero would indicate a flat distribution (Pallant, 2020; Tabachnick & Fidell, 2019). The Kolmogorov-Smirnov and Shapiro-Wilk tests give an indication of the degree of deviance from a normal distribution; however, in a sample of this size it is likely to show a significant result indicating a non-normal distribution (Tabachnick & Fidell, 2019).

All three measures were assessed as significant using the Shapiro-Wilk test (p <.05). A Shapiro-Wilk test has more ability to detect non-normal distribution than the Kolmogorov-Smirnov test (Field, 2018). Table 1 outlines these results.

Table 1

Tests of Normality

Measure	Kurtosis	Skewness	Kolmogorov- Smirnov	Shapiro-Wilk
CESD-R	3.1	1.56	<.001	<.001
DHS Frequency	-0.6	0.29	.20	.02
DHS Severity	-0.33	0.85	<.001	<.001

Note: CESD-R = The Center for Epidemiologic Studies Depression Scale-Revised, DHS = Daily Hassles Scale. *N* = 126

In large samples (100 or more) the significance of skewness and kurtosis is less important than the actual shape, which can be assessed by visual appearance (Tabachnick & Fidell, 2019). Histograms with a normal curve overlaid for each measure were visually inspected, as well as probability plots and detrended expected normal probability plots. All three measures showed visual signs of a non-normal distribution.

When data are grouped, the sampling distribution of means is evaluated, rather than the distribution. The central limit theorem predicts that when samples are large enough (>30) the distribution of the sample means will reach normality, regardless of the shape of the same distributions (Field, 2018). Even with heavy tails, for sample sizes of 100-160, statistics will remain robust against violations of normality (Tabachnick & Fidell, 2019). Given that this sample size could be considered large (>50), correlation, hierarchical and multiple linear regression analysis will remain robust against normality violations. Likewise, the independent samples t-test is fairly robust to deviations from normal with sample sizes greater than 40 (Allen et al., 2014). With regard to non-parametric tests, these provide more freedom with fewer assumptions than parametric tests. Non-parametric tests such as the chi-squared test assume a non-normally distributed sample; however, the trade-off to this benefit is a loss of power (Field, 2018), as data are ranked, and therefore, there is a loss of variance between cases. Logistic regression takes a similar stance: instead of attempting to predict values, you are trying to predict probability.

Part 1: Descriptive Statistics

Sample Demographics

The population of interest was NZ elite athletes who came from 14 different sports disciplines and who were part of the HPSNZ elite athlete support system. The total sample for this study consisted of 126 elite athletes from a possible total of 309 athletes (40.7% response rate). Of these, 53.4% were female, and 46.6% were male. The majority (71.4%) were NZ European: Māori made up 15.8% of participants, and 9% were Pacific Peoples. The majority (35.3%) were in the age range of 21-24 years. To protect the participants' anonymity, the specific sport descriptive information (e.g., triathlon) has not been provided; instead, information is provided describing whether the athlete competed in a team sport or as an individual (sport type). Age, gender, ethnicity, and sport type are presented in Table 2. The remaining descriptive demographics relating to general health and athlete-specific challenges are presented in Appendix P.

Table 2

Descriptive Statistics for Participant Variables

Variable	*n*	%
Age		
18-20	12	9.5
21-24	45	35.7
25-29	38	30.2
30-34	25	19.8
35+	6	4.8
Gender		
Female	69	54.8
Male	57	45.2
Other	0	0
Ethnicity		
Europeans	89	70.6
Māori	20	5.9
Pacific Peoples	12	9.5
Other	5	4
Sport Type		
Team	37	29.2
Individual	89	70.6

Note. *n* = Number of participants; % = Percentage of total participants, *N = 126*

Dependent Variables

The means and standard deviations dependent measures: CESD-R, DHS Frequency and DHS Severity, are displayed in Table 3.

Table 3

Descriptive Statistics for Symptoms Consistent with Depression and Hassles Variables

Variables	M	*(SD)*
CESD-R[a]	10.54	(9.75)
DHS Frequency [a]	30.67	(19.81)
DHS Severity [a]	1.28	(0.26)

Note: CESD-R = The Center for Epidemiologic Studies Depression Scale Revised, DHS = Daily Hassles Scale,

[a] Higher scores reflect an increase in either symptoms consistent with depression, or hassles frequency or severity. *N* = 126

Generalisability of Sample

Chi-square tests for goodness of fit were preformed to compare the proportion of participants for the demographic variables (gender, age, sport type) with expected proportions based on current HPSNZ data available. All expected cell frequencies were greater than 5. The Chi-square goodness-of-fit test showed that the distribution of participants in each age category (18-20, 21-24, 25-29, 30-34, 35+) did not significantly differ from expected proportions, (χ^2 = 3.561; df = 4; *p* = 0.469). The test also showed that the distribution of participants in each gender did not significantly differ from expected proportions (χ^2 = 1.674; df = 1; *p* = 0.196). However, comparing athletes who competed as part of a team sport compared with athletes who compete as individuals, the Chi-square goodness-of-fit test showed that the distribution of participants in each group did significantly differ from expected proportions (χ^2 = 13.653; df = 1; *p* = <.001). Ethnicity data was not available.

Correlation Analysis

To explore significant relationships between continuous and dichotomous variables, a point-biserial correlation analysis was performed (see Figure 8). Variables with more than 2 levels

(e.g., age) were dummy coded with the higher code (1) representing the variable level of interest and the lower code (0) representing all other levels in the variable. Therefore, only a positive score would indicate a relationship of interest. Due to insufficient responses to the only skip pattern question in the study (antidepressant use), a coefficient score was unable to be calculated; therefore, this variable was removed from the analysis. Homogeneity of variances was assessed using Levene's test for equality of variances. All variables had equal variances except one, which was excluded from the analysis (substance abuse). Given that this analysis was designed to explore the relationship between variables, and the sample size was greater than 50, the violation of normality was acceptable in this situation.

There were strong statistically significant correlations between symptoms consistent with depression and hassles frequency (r_{pb} = .58, p <0.01), and hassles severity (r_{pb} = -.56, p <0.01). Furthermore, hassles frequency and severity showed a significant relationship (r_{pb} = -.51, p <0.01). All other significant relationships were only weak in strength. A full correlation matrix is shown in Figure 8.

Figure 8

Point–Biserial Correlation Analysis

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1.	Gender [a]	--																										
2.	Age < 25	.03	--																									
3.	Age 25 to 29	-.03	-.59	--																								
4.	Age >30	.00	-.51	-.37	--																							
5.	Work full time	-.09	-.15	.05	.12	--																						
6.	Work part time	.17	.11	-.06	-.07	-.31	--																					
7.	Work occasionally	.08	.01	-.01	.00	-.24	-.30	--																				
8.	Emplyment no	-.15	.02	.02	-.04	-.35	-.43	-.33	--																			
9.	Retire yes	-.06	-.06	-.14	.21*	.12	.00	-.01	-.10	--																		
10.	Retire no	.07	.04	.15	-.21	-.09	.09	-.07	.06	-.56	--																	
11.	Retire unsure	-.04	-.01	-.07	.08	.02	-.10	.09	.01	-.13	-.74	--																
12.	Original study [c]	.08	-.22	.07	.18*	.05	.08	-.03	-.09	.17	-.197*	.10	--															
13.	Sport Type [b]	-.10	.27**	-.18	-.12	-.31	.24**	.09	-.04	.08	.02	-.09	-.07	--														
14.	Moved from home [c]	.25**	.01	-.03	.03	-.18	.19*	.01	-.03	.12	-.09	.02	-.04	.16	--													
15.	Diagnosed with depression [c]	.03	-.03	.10	-.08	.13	-.06	.04	-.10	-.04	.09	-.08	.06	-.10	-.01	--												
16.	Antidepressants [c]	.06	.10	-.04	-.07	.10	.04	-.01	-.12	.06	-.11	.08	.05	-.13	.07	.44**	--											
17.	Antidepressant medication [c]	-.61	.25	-.61	.41	.c	.25	-1	.61	.c	.c	.c	.c	.c	-1	-.61	.c	--										
18.	Family history [c]	.01	.06	.01	-.08	.07	.01	-.13	.04	-.05	.02	.01	.00	-.18	.02	.12	.14	-.61	--									
19.	Injury [c]	.08	-.12	.12	.00	-.11	.05	.12	-.06	-.03	.10	-.10	.02	.29**	.14	-.04	-.05	-.25	-.08	--								
20.	Surgery [c]	.06	-.16	.17	.01	.11	.09	-.04	-.15	.11	.06	-.16	.08	.07	-.01	.13	-.07	.c	.07	.26**	--							
21.	Eating disorder [c]	-.27	-.18	.07	.14	.12	-.06	-.09	.03	-.07	.11	-.07	.09	-.12	-.10	.21*	.06	-.25	.05	.08	-.04	--						
22.	Alcohol intake [c]	.19*	.17	-.17	.00	-.13	.01	.09	.03	.06	.12	-.18	.04	.08	-.05	-.05	-.04	.c	-.12	-.03	-.06	-.06	--					
23.	Substance abuse [c]	.10	-.10	.06	.05	.05	-.14	.04	.06	.03	-.05	.04	.02	-.06	.07	-.02	-.02	.c	-.06	-.06	-.03	-.03	-.02	--				
24.	Concussion [c]	.03	-.03	-.13	.17	.01	-.02	.14	-.11	-.01	-.09	.12	.07	.07	-.08	.04	.09	-.25	.07	.17	-.10	.08	.11	-.03	--			
25.	Total Score CESD - R	-.07	.20*	-.16	-.07	-.22	.17	.11	-.06	.18*	-.13	.00	.00	.23**	-.07	-.17	-.11	.25	-.17	-.02	.01	-.29**	.13	-.12	-.14	--		
26.	DHS Frequency	-.04	.24**	-.23	-.03	-.17	.10	.02	.03	.16	-.30	.23**	.01	.32**	-.13	-.02	.03	.11	-.09	.06	.08	-.13	.00	-.07	.02	.58**	--	
27.	DHS Severity	-.22	.24**	-.14	-.13	.00	.02	-.02	.00	.18	-.21	.11	.04	.24**	-.10	-.03	.02	.23	-.05	.01	.01	-.18*	.06	-.04	-.04	.56**	.51**	--

Note. [a] 0 = Male, 1 = Female, [b] 0 = Team sport, 1 = Individual, [c] 0 = No, 1 = Yes, DHS = Daily Hassles Scale. CESD-R = The Center of Epidemiologic Studies Depression-Revised

* p <.05, ** p <.001

Part 2: Hypothesis Tests

The next section will discuss the findings for the study hypotheses 1 to 5.

1. Females will experience higher rates of moderate symptoms consistent with depression compared to males.

To meet the criteria for moderate symptoms consistent with depression, participants must attain a score of 16 or higher on the CESD-R measure. Analysis of the data was conducted through the use of frequency tables, revealing that 27 individuals had moderate symptoms consistent with depression, with 12 being female and 15 being male. Although the sample size was theoretically too small to conduct a *t*-test for this hypothesis, with a beta of 7.8% according to G*Power 3.1 (Faul et al., 2009), the analysis is reported below.

An independent samples *t*-test was conducted to determine whether there was a statistically significant difference in symptoms consistent with depression between males and females. Homogeneity of variances was assessed using Levene's test for equality of variances (p = .09). Mean symptoms consistent with depression scores were more severe in male athletes (M = 26.53, SD = 10.41) than female athletes (M = 24.67, SD = 6.15); however, there was no statistically significant difference, M = -1.48 95% CI [-.8.88 to 5.15], $t(25)$ = -.548, p = .589. The effect size for this analysis was weak (d = -.21). This hypothesis was not supported.

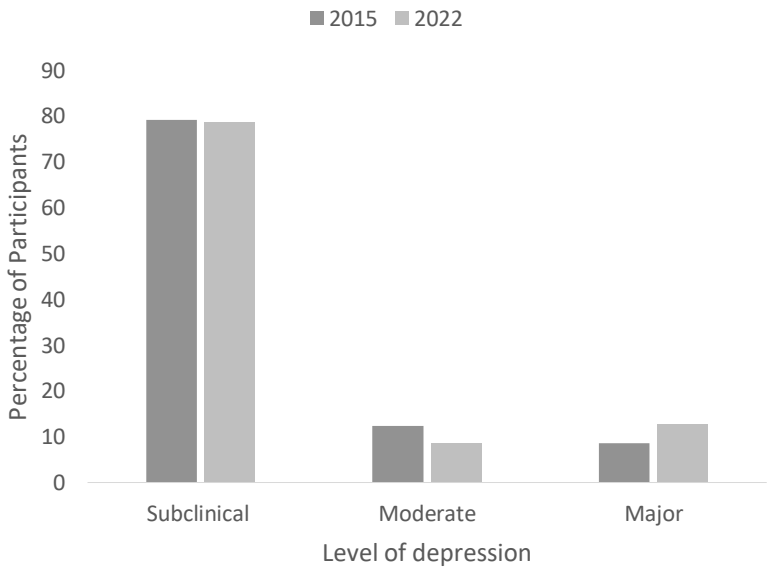
2. Rates of symptoms consistent with depression in NZ elite athletes will have increased since 2015.

To compare the level of symptoms consistent with depression scores, scores were totalled and categorised relative to cut-offs. Findings showed that the combined rates of moderate and major symptoms consistent with depression were similar in both studies. In 2015, 20.9% met the criteria for both moderate and/ or major symptoms consistent with depression; this is comparable to the current study at 21.4%. However, differentiating between moderate and major symptoms

consistent with depression, it can be seen that in 2015, 8.6% met the criteria for major symptoms consistent with depression, while in the current study, 12.7% met the criteria for major symptoms consistent with depression (see Figure 9).

Figure 9

Rates of Symptoms Consistent with Subclinical, Moderate and Major Depression in 2015 and 2022 Samples



Note: Subclinical depression = >16, Moderate depression ≥16, Major depression = >22 using The Center of Epidemiologic Studies Depression Scale-Revised, 2015 *N* = 187, 2022 *N* = 126

3. Participants under 25 years of age will experience higher mean levels of symptoms consistent with depression than athletes above 25 years of age.

An independent-sample *t*-test was run to determine whether there was a statistically significant difference in mean symptoms consistent with depression between athletes under the age of 25 and athletes over the age of 25. Homogeneity of variances was assessed using Levene's test for equality of variances (p = .091). Symptoms consistent with depression were experienced more in athletes under the age of 25 (M = 12.7, SD = 11.1) than in athletes over the age of 25 (M = 8.7, SD =

8.7), with a statistically significant difference, M = 3.4, 95% CI [.58, 7.4], $t(124) = 2.320$, $p = .022$. The effect size for this analysis was $d = .41$. This hypothesis was supported.

4. Participants who compete as individuals compared to those competing in a team will have higher mean levels of symptoms consistent with depression.

An independent samples *t*-test was run to determine whether there was a statistically significant difference in symptoms consistent with depression between athletes who compete as individuals compared to athletes who compete in a team. Homogeneity of variances was not significant, as assessed by Levene's test for equality of variances ($p = .068$). Symptoms consistent with depression were experienced more in athletes who competed as individuals (M = 11.93, SD = 10.20) compared to athletes who competed as part of a team (M = 7.05, SD = 7.74). This was a statistically significant difference, M = 4.8 95% CI [1.17, 8.58], $t(123) = 2.606$, $p = .010$. The effect size for this analysis ($d = .51$) was found to be large ($d \geq .5$). This hypothesis was supported.

5. Frequency and severity of hassles will be significant predictors of symptoms consistent with depression.

A hierarchical multiple regression was run to determine whether the addition of hassles frequency and severity improved the prediction of symptoms consistent with depressive over and above risk factor variables of age, sport type, retirement status, family health and eating disorder history. These risk factors were selected because they significantly correlated with symptoms consistent with depression (Figure 8). As there was only one continuous independent variable, linearity was confirmed by partial regression plots and a plot of studentized residuals against the predicted values (see Appendix N). There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.393. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values (see Appendix N). There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were two

studentized deleted residuals greater than ±3 standard deviations; however, they were included in the analysis as it was deemed that they were not data entry errors. There were no leverage values greater than 0.2, or values for Cook's distance above 1 (Cook & Weisberg, 1982)**.** There were mild violations of normality as seen in the Q-Q plot (see Appendix N).

Significantly correlating variables for symptoms consistent with depression were entered at step 1 and explained 17.8% of the variance in symptoms consistent with depression symptoms R^2 = .17.8, $F(5, 120) = 4.968$, $p < .001$. Next, hassles frequency was entered at step 2; this enabled researchers to see how hassles frequency alone predicted symptoms consistent with depression. With hassles frequency, the variance explained a further 20.9% of the variance, R^2 of 38.7, $F(6, 120) = 11.985$, $p < .001$. Finally, hassles severity was added at step 3, and explained a further of 8% of the variance $R^2 = 46.7$, $F(7, 120) = 14.136$, $p < .001$ (see Table 4). The full model of age, sport type, retirement status, family health and eating disorder history and hassles frequency (step 3) was statistically significant, $R^2 = 46.7$, $F(7, 120) = 14.136$, $p < .001$; adjusted R^2 = .43.4%.

Table 4

Hierarchical Multiple Regression with Symptoms Consistent with Depression as Outcome Variable and Predictor Variables

	Symptoms Consistent with Depression					
	Step 1		*Step 2*		*Step 3*	
Variable	*B*	β	*B*	β	*B*	β
Step 1: Control	26.39**		18.61**		3.807	
Age	2.87	0.147	0.973	0.05	0.344	0.018
Sport Type	2.29*	0.106	-0.096	-0.004	-0.635	-0.029
Retire	5.34	0.158	3.003	0.089	1.804	0.053
Family	-3.48	-0.162	-2.73	-0.127	-2.94	-0.137
Eating Disorder	-6.88*	-0.226	-6.23*	-0.205	-5.24*	-0.172
Step 2						
Hassles Frequency			0.253**	0.496	0.175	0.344
Step 3						
Hassles Severity					12.94**	0.34
R^2	*0.178*		0.387		0.467	
F	4.97**		11.99**		14.14**	
ΔR^2	*0.178*		0.209		0.08	
ΔF	4.97**		38.89**		16.97**	

Note: Model = "Enter" method in SPSS Statistics; [a]0 = Under 25, 1 = Over 25;[b] 0 = Team sport, 1 = Individual sports; [c] 0 = Not retiring, 1 = Yes or unsure about retiring; [d] 0 = No family history of mental illness, 1 = Family history of mental illness; [e] 0 = No history of an eating disorder, 1 = Diagnosis of an eating disorder; [f] DHS Frequency; *B* = Unstandardised regression coefficient; CI = Confident interval; *LL* = Lower limit; *UL* = Upper limit; *SE B* = Standard error of the coefficient; β = Standardised coefficient; R^2 = Coefficients of determination; ΔR^2 = R^2 change; * p <.05; ** p < .01; *** p < .001.

Part 3: Exploratory Analysis

Comparison Analysis

The next section will focus on exploring comparisons from the 2015 study and extending the current study. To facilitate a direct comparison of findings between the current study and the 2015 study, identical tests were employed. The section will begin by analysing the scores from the CESD-R between the two studies, followed by analysis related to hassles. Finally, analysis showing extensions of the current study will be discussed.

Symptoms of Depression Comparison

Test for Associations – Depression. A chi-square test for association was performed between the same variables used in 2015 and symptoms consistent with depression level. Age, gender, sport type, ethnicity, employment status, centralised, family health, recent injury and retirement variables were examined by cross-tabulation. This analysis used the total scores on CESD-R as a categorical variable where cases met the cut-off score for moderate symptoms consistent with depression (≥16), or for major symptoms consistent with depression (>22), or neither.

One assumption of the chi-squared test is that expected cell frequencies cannot be less than 5 for 2 x 2 contingency tables. Violation of this assumption creates a reduction in test power (Field, 2018). Independent variables used both 2 x 2 contingency tables and 3 x 2 tables. Of the 2 x 2 tables, two variables had counts less than 5: the question about eating disorders and the question about concussion. In this case, Fisher's exact test statistic was interpreted to adjust for the low cell frequencies (Field, 2018). For variables with more than two levels, cell counts must not be over 20% of the expected count. Age and ethnicity were collapsed prior. The variable of retirement status failed this assumption and was subsequently collapsed. Due to overcorrection, the Yate's correction was not applied in this analysis as the Pearson chi-square generally provides adequate control over type I error probabilities (Haviland, 1990).

Individual athletes were significantly associated with depressive symptomology in both studies; however, planning for retirement was significant in the 2015 study only (see Table 5). Ethnicity was not analysed in the original or current study.

Table 5

Moderate and Major Symptoms Consistent with Depression in Relation to Variables for Current Study and Comparison of Chi-Squared Statistics

		Moderate Depression [a] (CESD-R≥16)						Major Depression (CESD-R>22)			
Variable	*N* = 126	No *n* = 99	Row % 78.57	Yes *n* = 27	Row % 21.40	Chi squared *p* value 2015	Chi squared *p* value 2022	No *n* = 110	Row % 87.30	Yes *n* = 16	Row % 12.69
Age						.16	.34				
18-20	12	8	66.67	4	33.33			10	83.33	2	16.67
21-24	45	33	73.33	12	26.67			38	84.44	7	15.56
25-29	38	33	86.84	5	13.16			36	94.74	2	5.26
≥30	31	25	80.65	6	19.35			26	83.87	5	16.13
Gender						.87	.22				
Female	69	57	82.61	12	17.39			61	88.41	8	11.59
Male	57	42	73.68	15	26.32			49	85.96	8	14.04
Other	0	0	0.00	0	0.00			0	0.00	0	0.00
Type of Sport						.02*	.01**				
Individual	89	64	71.91	25	28.09			75	85.23	14	15.91
Team	37	35	94.59	2	5.41			35	94.59	2	5.41
Centralisation						.44	.95				
No	46	36	78.26	10	21.74			41	78.85	5	9.62
Yes	80	63	78.75	17	21.25			69	93.24	11	14.86

		Moderate Depression [a] (CESD-R≥16)						Major Depression (CESD-R>22)			
Variable	*N* = 126	No *n* = 99	Row % 78.57	Yes *n* = 27	Row % 21.40	Chi squared *p* value 2015	Chi squared *p* value 2022	No *n* = 110	Row % 87.30	Yes *n* = 16	Row % 12.69
Family history of mood illness						.56	.61				
No	89	71	79.78	18	20.22			80	89.89	9	10.11
Yes	37	28	75.68	9	24.32			30	81.08	7	18.92
Recent injury	0					.21	.92				
No	85	67	78.82	18	21.18			72	84.71	13	15.29
Yes	42	33	78.57	9	21.43			38	92.68	3	7.32
Employment status	0					.96	.15				
No	41	33	80.49	8	19.51			37	90.24	4	9.76
Occasionally	24	18	75.00	6	25.00			19	79.17	5	20.83
Part time	35	24	68.57	11	31.43			29	82.86	6	17.14
Full time	26	24	92.31	2	7.69			25	96.15	1	3.85
Planning retirement [b]						.01**	.12				
No	97	78	80.41	19	19.59			88	114.29	9	11.69
Undecided	18	15	83.33	3	16.67			16	88.89	2	11.11
Yes	11	6	54.55	5	45.45			6	54.55	5	45.45

Note: χ^2 = Chi-Square, ϕ = Phi. [a] = Symptoms consistent with depression, [b] = In the next 12 months. * p <.05; ** p < .01; *** p < .001.

Risk of Depression. A binomial logistic regression analysis was conducted to examine the odds ratios of individuals developing symptoms consistent with depression currently compared to in 2015. The same variables used in the 2015 study (age, gender, centralisation, retirement, ethnicity, injury, and sport type) were imputed. There was one standardised residual with a value above 2.5 standard deviations (*SD* =2.556), which was kept in the analysis. Logistic regression assumes linearity between continuous predictors and outcomes; however, this analysis only used categorical predictors, so it is irrelevant.

The logistic regression model was not statistically significant, $\chi^2(8) = 12.798$, $p < .119$. The model explained 14.9% (nagelkerke R^2) of the variance in symptoms consistent with depression and correctly classified 78.6% of cases. Sensitivity was 11.1%, specificity was 97%, positive predictive value was 50%, and negative predictive value was 20%. Of the nine predictor variables, only sport type was statistically significant ($p = .02$) (as shown in Table 6).

Individual athletes had 6.8 times higher odds of developing symptoms consistent with depression than athletes in team sports. This was higher than in 2015, when the odds ratio was 4.2. Athletes who were unsure about retiring or had decided to retire had a 1.5 times increased likelihood of developing symptoms consistent with depression compared to athletes who were not retiring from sport. In 2015 athletes who were unsure about retiring had an odds ratio of 9, while athletes who were certain about retirement had an odds ratio of 4.

Table 6

Logistic Regression for Predicting the Likelihood of Developing Moderate Symptoms Consistent with Depression Compared to 2015

	B	S.E. B	95% C.I. for Odds Ratio		Wald	*p*	2015 Odds Ratio	2022 Odds Ratio
Predictor			LL	UL				
Age [a]	-0.37	0.49	0.27	1.80	0.56	.45		0.68
Gender [b]	-0.36	0.49	0.27	1.81	0.55	.46		0.7
Sport Type [c]	1.92	0.83	1.33	35.04	5.31	.02	4.2	6.8
Centralised [d]	0.09	0.50	0.42	2.90	0.04	.85		1.1
Retire[e]	0.43	0.52	0.55	4.30	0.68	.41	9/ 4	1.5
Employment [f]	-0.11	0.47	0.36	2.23	0.06	.81		0.9
Family History [g]	0.04	0.49	0.40	2.72	0.01	.94		1
Injury/ Illness [h]	0.35	0.53	0.51	3.98	0.44	.51		1.4
Constant	-2.73	1.14			5.79	.02		0.07

Note: [a] 0 = Under 25, 1 = Over 25; [b] 0 = Male, 1 = Female; [c] 0 = Team sport, 1 = Individual Sports; [d] 0 = Has not moved away from home, 1 = Moved from home; [e] 0 = Not retiring, 1 = Yes or unsure about retiring; [f] 0 = No, or occasionally, 1 = Yes or part time; [g] 0 = No family history of mental illness, 1 = Family history of mental illness; [h] 0 = No recent injury/ illness, 1 = Recent injury/ illness'. CI = Confidence interval; *LL* = Lower limit, *UL* = Upper limit; *B* = Unstandardised regression coefficient; *SE B* = Standard error of the coefficient; *p* = Probability value. 2015 *N* = 187, 2022 *N* = 126

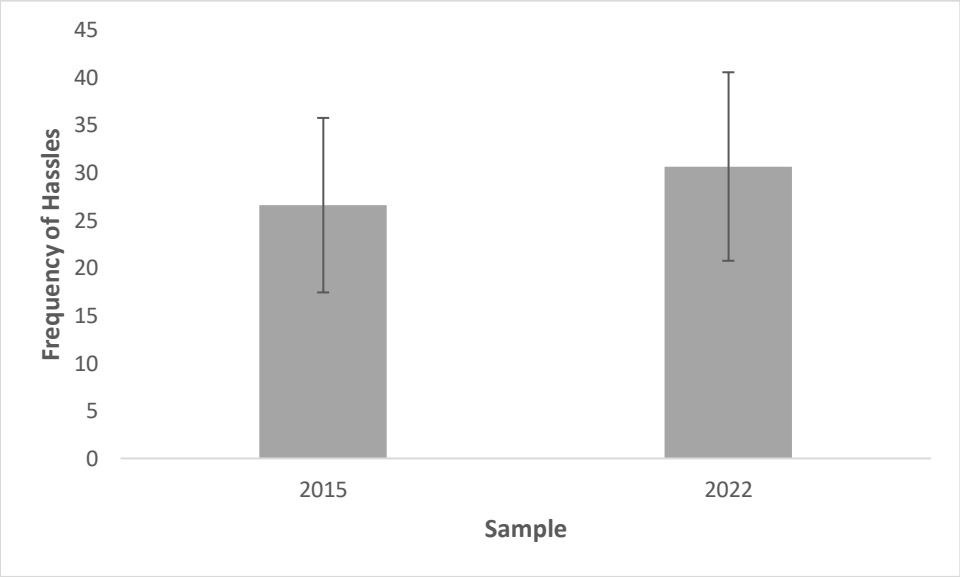
Hassles Comparison Analysis

Comparison of Hassles Frequency. Hassles frequency was assessed using total hassles endorsed on the DHS measure. A two-tailed independent samples *t*-test was computed and analysed to compare mean DHS frequency scores between 2015 and 2022. Participants from 2022 (*M* = 30.66; *SD* = 19.8) endorsed a non-significant difference in frequency of hassles compared to

participants in the 2015 study (*M* = 26.6; *SD* = 18.33), with a small effect size *M* = 4.06, *t*(311) = 1.861, *p* = .064, *d* = -.2 (see Figure 10).

Figure 10

Mean Hassles Frequency Scores for 2015 and 2022 Samples



Note: Errors bars represent standard deviation. 2015 *N* = 187, 2022 *N* = 126.

Prediction of Hassles Frequency. Multiple linear regression was performed using variables that had significant correlations (see Figure 8) from the current study with the outcome variable of hassles frequency. The same analysis was performed in 2015. Age, sport type, retirement status and symptoms consistent with depression were included in the regression analysis. There was an independence of residuals, as assessed by a Durbin-Watson statistic of 1.73. There was a linear relationship between the continuous predictor variable of symptoms consistent with depression and the outcome variable hassles frequency. The R^2 for the overall model was 44.8% with an adjusted R^2 of 43%; a medium-size effect according to Cohen (1988). Sport type, retirement status and symptoms consistent with depression significantly predicted daily hassles frequency *F*(4, 121) = 24.531, *p* < .001 (see Table 7). A comparison between these findings and those from 2015 will be presented in the discussion chapter.

Table 7

Multiple Linear Regression for Frequency of Hassles and Current Predictor Variables

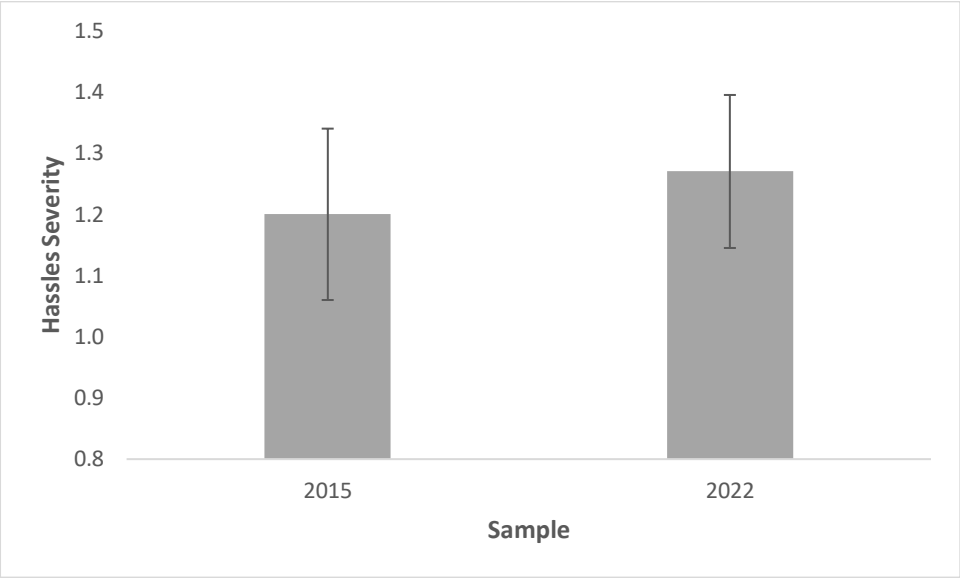
	B	95% CI for B		*SE B*	β	*p*
		LL	*UL*			
Model						
Constant	19.49	10.03	8.9	4.8		<.001
Gender [a]	2.04	-3.78	7.8	2.9	.05	.49
Sport Type [b]	9.97	3.56	16.4	3.2	.23	.003
CESD-R [c]	1.06	.76	1.4	.15	.52	<.001
Centralised [d]	-5.96	-12.06	0.1	3.1	-.15	.06

Note. [a] 0 = Male, 1 = Female; [b] 0 = Team sport, 1 = Individual sports; [c] = Total score on The Center for Epidemiologic Depression Scale Revised; [d] 0 = Has not moved away from home, 1 = Moved from home; CI = Confidence interval; *LL* = Lower limit, *UL* = Upper limit; *B* = Unstandardised regression coefficient; *SE B* = standard error of the coefficient; β = Standardised coefficient; *p* = Probability value; R^2 = .448 with an adjusted R^2 = .430.

Comparison of Hassles Severity. Hassle severity scores were compared between the two studies. A two-tailed independent samples *t*-test was computed and analysed to compare mean DHS severity scores between 2015 and 2022. Participants from 2022 (*M* = 1.27; *SD* = 0.25) endorsed a significantly higher severity of hassles compared to participants in the 2015 study (*M* = 1.2; *SD* = 0.28), with a small effect size *M* = 0.07, *t*(311) = 2.258, *p* = .024, *d* = -.28 (see Figure 11).

Figure 11

Mean Hassles Severity Scores for 2015 and 2022 Samples



Note: Errors bars represent standard deviation. 2015 *N* = 187, 2022 *N* = 126.

Prediction of Hassles Severity. Multiple linear regression was performed using variables that had significant correlations (see Figure 8) from the current study with the outcome variable of hassles severity. Gender, age, sport type, eating disorder, and symptoms consistent with depression were all included in the regression analysis. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.11. There was homoscedasticity, as assessed by visual inspection of a plot of standardized residuals versus standardized predicted values.

R^2 for the overall model was 37.4% with an adjusted R^2 of 34.6%; a moderate effect size according to Cohen (1988). Symptoms consistent with depression, female gender, athletes who compete in individual sports, and centralisation significantly predicted daily hassles frequency F (,5 115) = 13.715, $p < .001$ (see Table 8). How these findings compare with 2015 will be detailed in the discussion chapter.

Table 8

Multiple Linear Regression for Severity of Hassles and Current Predictor Variables

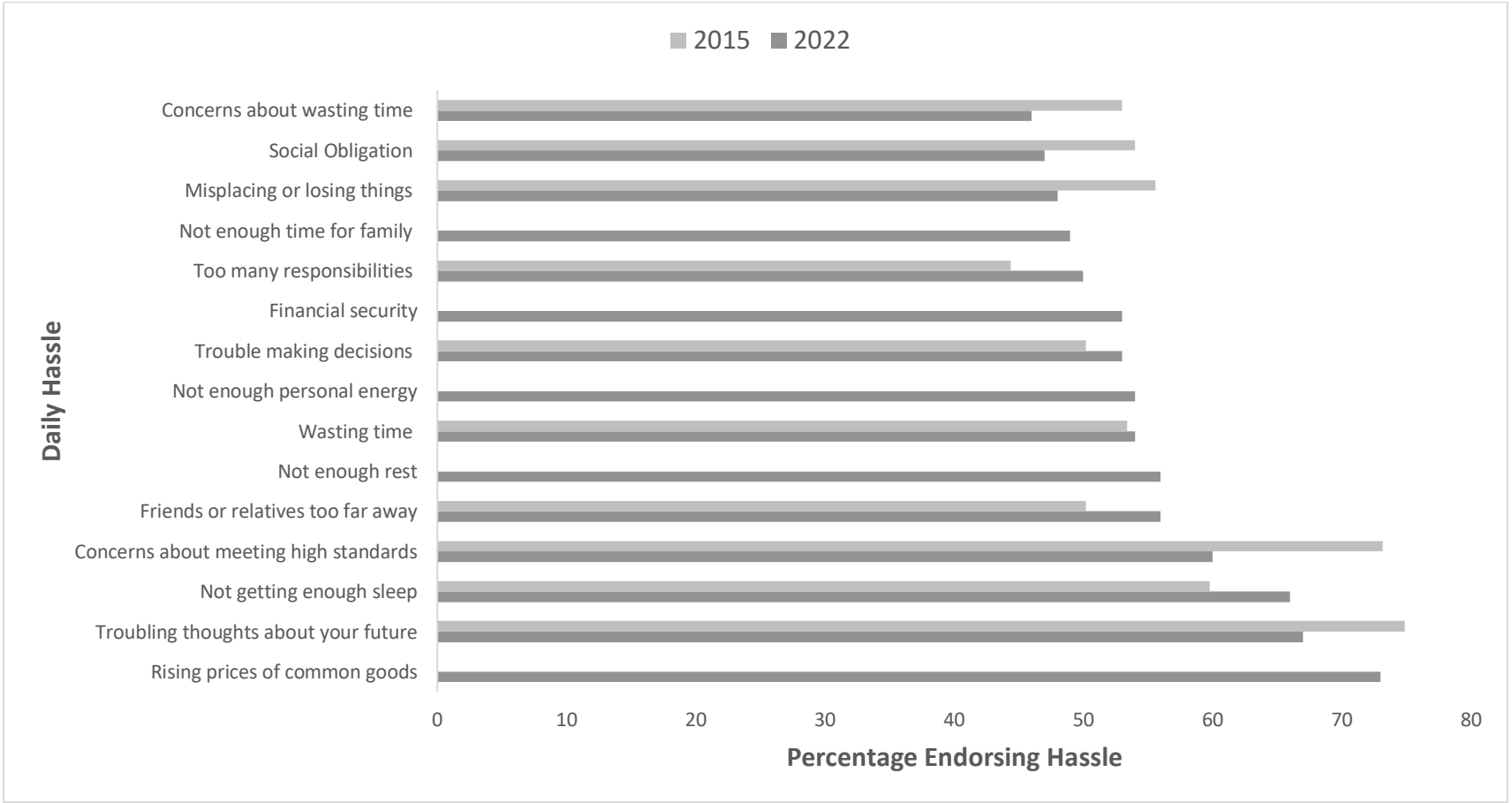
	B	*95% CI* for *B*		*SE B*	β	*p*
		LL	*UL*			
Variable						
Constant	1.13	0.93	1.52	0.134		<.001
Gender [a]	-0.01	1.17	0.02	0.04	.19	.02
Age [b]	0.06	-0.02	0.14	0.04	.12	.15
Sport Type [c]	0.05	-0.04	0.14	0.05	.09	.28
Eating Disorder [d]	-0.05	-0.18	0.08	0.07	.06	.46
Total Score CESD-R [e]	0.01	0.01	0.02	0.002	.48	<.001

Note. Model = "Enter" method in SPSS Statistics, [a] 0 = Male, 1 = Female; [b] 0 = Over 25, 1 = Under 25. [c] 0 = Team sport, 1 = Individual Sports. [d] 0 = No history of an eating disorder, 1 = Diagnosis of an eating disorder; [e] Total score The Center for Epidemiologic Depression Scale Revised. CI = Confidence interval; *LL* = Lower limit, *UL* = Upper limit; *B* = Unstandardised regression coefficient; *SE B* = Standard error of the coefficient; β = Standardised coefficient *p* = Probability value; R^2 = .374 Adjusted R^2 = .346

Comparison of Daily Hassles. The Daily Hassles measure consists of 117 daily hassles. Each daily hassle was analysed to determine what percentage of athletes had endorsed each individual daily hassle. A figure showing the 12 most frequently endorsed daily hassles was published as part of the 2015 study. Using the same significance level throughout this study (5%) equated to 6 hassles, Figure 12 shows the highest endorsed daily hassles for the current study and how they compared to daily hassles in 2015. The current study showed the hassle of 'rising prices of common goods' was the most endorsed (73%), and "not enough rest" was number 6. Both these daily hassles were not featured within the top 12 hassles in 2015.

Figure 12

Comparison of Highest Endorsed Daily Hassles From Current Study and 2015



Note: 2015 *N* = 187, 2022 *N* = 126. Where there is missing data for 2015, the daily hassle shown did not rank among the top 12 most commonly reported daily hassles.

Extending the Current Study

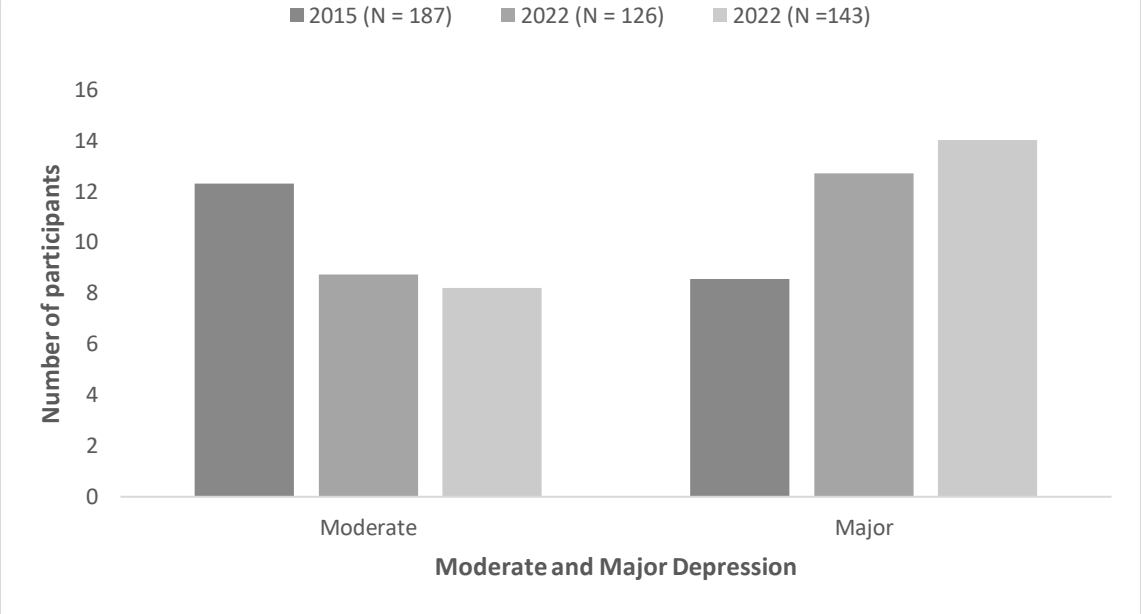
The following section shows the findings from statistical tests that seemed logical to conduct having completed the previous analysis. The current study primarily aimed to compare findings from the 2015 study; however, it also aimed to extend the analysis by exploring new variables that showed significant correlations with outcomes of interest. In addition, although a strict missing data criterion was applied in 2015, there was an opportunity to increase the sample size by using participant data that was complete for individual measures, rather than the entire survey.

Does the level of symptoms consistent with depression change when all cases who completed the CESD-R are included?

To compare data between 2015 and 2022 accurately, the same data exclusion methods were applied. However, to extend the analysis, total scores of the CESD-R were examined for all participants who completed the measure (20 items), not just those who completed the entire survey. We can see that by including these participants, our current study sample increased from 126 to 144, an increase of 18 participants. Furthermore, the rate of moderate symptoms consistent with depression decreased from 8.73% to 8.2% (based on the cut-off of ≥16), while major symptoms consistent with depression increased from 12.7% to 14% (based on the cut-off of >22). All three samples can be seen in Figure 13.

Figure 13

Comparison of Participants Meeting Criteria for Moderate and Major Symptoms Consistent with Depression



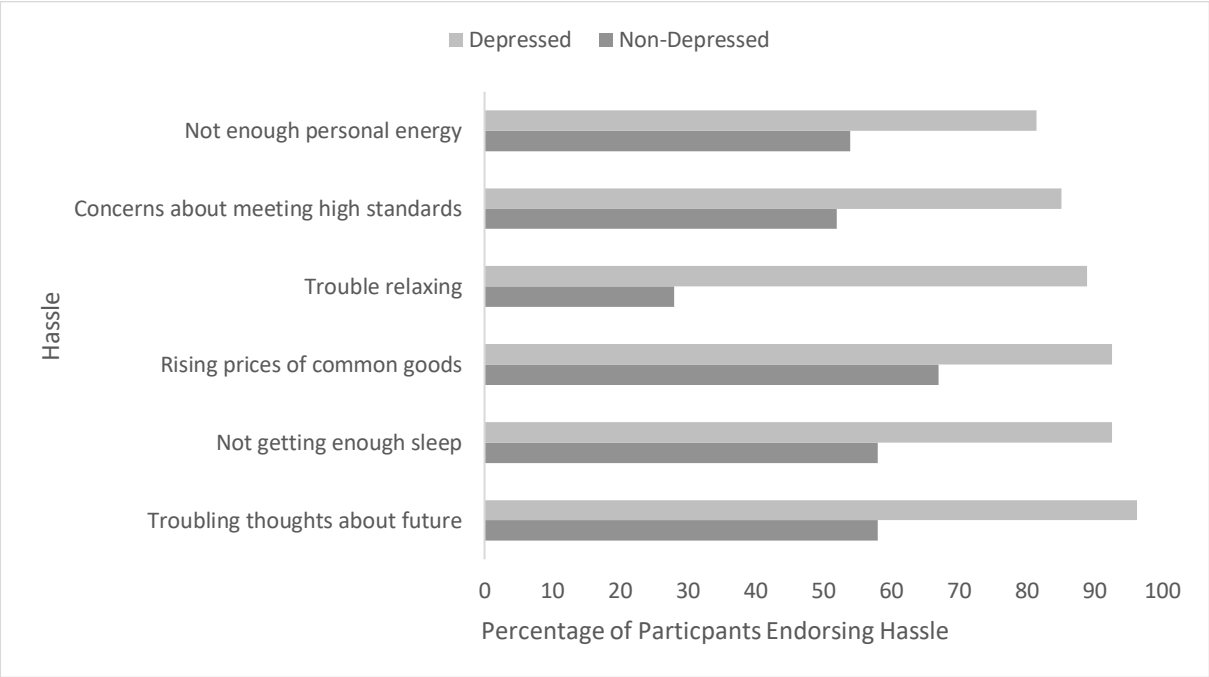
Note: Depression was measured using The Center for Epidemiologic Depression Scale-Revised. Moderate depression cut-off = ≥16. Major depression cut-off = >22.

Do depressed athletes endorse different hassles compared to non-depressed athletes?

We were interested to see whether participants who were experiencing moderate or major symptoms consistent with depression (depressed group) endorsed different hassles compared to those who were not (non-depressed grouped). The results showed that the depressed group members endorsed very similar hassles, but at higher percentages. The non-depressed group collectively endorsed similar hassles to the depressed group but in lower proportions. For example, in Figure 14, 96.3% of the depressed group endorsed 'troubling thoughts about the future', whereas only 58% of the non-depressed group endorsed this as a hassle. The most frequently endorsed hassle for the non-depressed was 'rising prices of common goods', which ranked only number three for the depressed group. 'Trouble relaxing' was the only hassle that did not feature in the top six hassles endorsed by the non-depressed group, as can be seen in Figure 14.

Figure 14

Figure Showing Endorsed Hassles by Group



Note: Depression was measured using The Center for Epidemiologic Depression Scale Revised. Depressed group *N*= 26, non-Depressed group *N* = 100

When controlling for 2015 variables, how much variance is further explained by current variables?

Given that hassles frequency is a more stable measure of stress than hassles severity, the researchers were interested to know if the current significant variables (see Figure 8) could explain any more variance after the 2015 predictor variables were controlled for. Over the 7 years (2015 to 2022), new variables (e.g., retirement) have become significantly associated with hassles frequency compared to 2015. Undertaking a hierarchical multiple linear regression shows whether further variance can be explained by these new variables.

As there was only one continuous independent variable, linearity was confirmed by partial regression plots and a plot of studentized residuals against the predicted values (see Appendix O). There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.752. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values (see Appendix O). There was no evidence of multicollinearity, as

assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations. There were no leverage values greater than 0.2, or values for Cook's distance above 1 (Cook & Weisberg, 1982)**.** Normality was confirmed as seen in the Q-Q plot (see Appendix O).

Significantly correlating variables from 2015 for hassles frequency were entered at step 1 and explained 39.4% of the variance in hassles frequency R^2 = .394, $F(4, 121) = 19.695$, $p < .001$. Variables from 2022 that were significantly correlated with hassles frequency (if not already entered) were entered at step 2. Age and retirement explained a further 8% of the variance, R^2 of .475, $F(6, 119) = 9.158$, $p < .001$. Both steps 1 and 2 were statistically significant (see Table 9).

Table 9

Hierarchical Multiple Linear Regression with 2015 and 2022 Variables

	Hassles Frequency			
	Step 1		*Step 2*	
Variable	*B*	β	*B*	β
Step 1: Control	19.48**		21.34**	
Depression [a]	1.06**	0.521	0.945**	0.465
Gender [b]	2.035	0.051	2.96	0.075
Sport type [c]	9.97*	0.23	9.99*	0.231
Centralised [d]	-5.96	-0.145	-7.49*	-0.183
Step 2:				
Age [e]			-3.84	-0.097
Retire [f]			13.1**	0.28
R^2	0.394		0.475	
F	19.70**		17.94**	
ΔR^2	0.394		0.08	
ΔF	19.7		9.16	

Note: Step = "Enter" method in SPSS Statistics; [a] = Total score on The Center of Epidemiologic Depression Revised-Scale, [b] 0 = Male, 1 = Female, [c] 0 = Team sport, 1 = Individual sport, [d] Have you moved away from home, 0 = No, 1 = Yes. [e] 0 = Under 25, 1 = Over 25, [f] 0 = Not retiring, 1 = Yes or unsure about retiring, *B* = Unstandardised regression coefficient; CI = Confident interval; *LL* = Lower limit; *UL* = Upper limit; *SE B* = standard error of the coefficient; β = Standardised coefficient; R^2 = Coefficients of determination; ΔR^2 = R^2 change; ΔF = F change.

* p <.05; ** p < .01; *** p < .001.

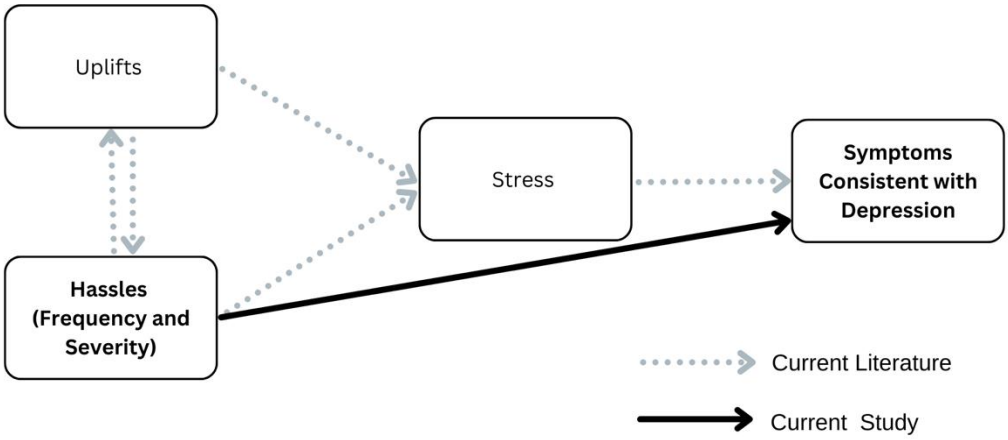
Chapter 7: Discussion

Introduction

The current study aimed to investigate the relationship between elite athletes, hassles and symptoms consistent with depression (see Figure 15); and aimed to compare these findings to those obtained in the 2015 study. Although the original study conducted in 2015 produced significant findings, it was necessary to determine whether these findings have persisted or evolved over the course of the past seven years.

Figure 15

Constructs Under Investigation in the Current Study, in the Context of Current Literature.



Note: This model adds to the model seen in Figure 4.

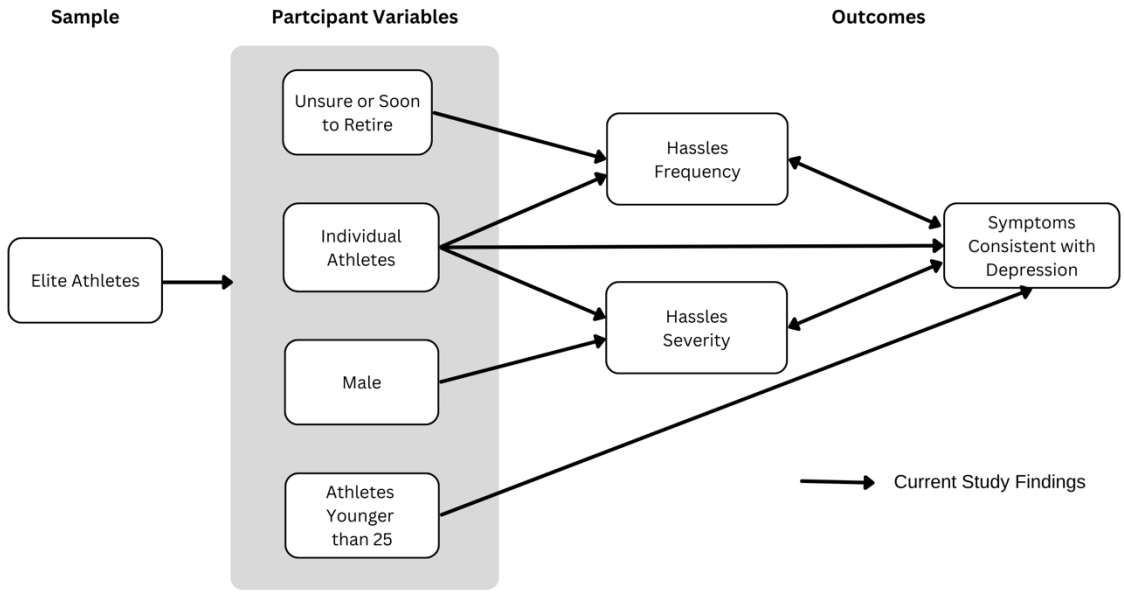
The first section of this chapter presents a model that highlights the significant findings obtained from the study (see Figure 16). Following this, the chapter delves into the results of each study hypothesis, followed by a discussion of the comparison analysis and tests undertaken to extend the current study. Finally, the study's limitations are discussed along with their practical implications.

Key Findings

The current study highlighted significant findings relating to hassles and symptoms consistent with depression in elite NZ athletes (see Figure 16). The study showed that specific cohorts of athletes are associated with increased frequency or severity of hassles and/ or symptoms consistent with depression. Individual athletes showed significant associations with all three constructs. Athletes who were about to retire or unsure about retirement were associated with increased hassles frequency, whereas male athletes were associated with increased hassles severity. Athletes younger than 25 were associated with increased symptoms consistent with depression. Hassles frequency and severity were associated with symptoms consistent with depression. Participants who endorsed not having a current or past history of an eating disorder showed a significant correlation with symptoms consistent with depression. However, this group was large (*n* =112), so there was a possibility of a type II error and therefore it has not been reported. The findings will now be discussed in more detail.

Figure 16

Key Findings from the Current Study



Note: Only significant findings are illustrated.

Hypotheses

Hypothesis 1. Females will experience higher rates of moderate symptoms consistent with depression compared to males.

It was hypothesised that female athletes would show higher rates of moderate and major symptoms consistent with depression compared to males. The findings showed that of the group who met the criteria for moderate and major symptoms consistent with depression, 44.4% were female; therefore, more males (55.45%) were experiencing moderate and major symptoms of depression than females. As predicted, due to the test being low-powered, no significance difference was seen.

Hypothesis 2: Overall rates of symptoms consistent with depression in NZ elite athletes will have increased since 2015.

This study sought to gather and analyse data in a way that enabled a direct comparison with findings obtained in 2015, using the same cut-off scores. We considered the combination of moderate and major symptoms consistent with depression as the overall rate. The overall rate of symptoms consistent with depression remained similar for both studies (2015 = 20.9% and 2022 = 21.4%); however, the current sample experienced more severe (major) symptoms consistent with depression. The findings indicated that moderate symptoms consistent with depression decreased by 3.6%; however, major symptoms consistent with depression increased by 4.1%.

It was hypothesised that the overall rate of symptoms consistent with depression experienced by participants in the study would have increased since the 2015 study. This prediction was based on two main sources of evidence. First, results from the NZ Health Survey (Ministry of Health, 2022) have seen the rate of depression diagnosis in the community increase from 15.4% to 19.3% over the last 7 years, an increase of 3.9%. Although a direct comparison of the overall symptoms consistent with depression rates (15.4% and 19.3%, respectively) is not possible due to

differences in method, an increase over time can be seen (3.9%), as the method of gathering statistics has remained consistent in both studies (NZ Health Survey and original/ current study).

On one hand the hypothesis was unable to be supported, as the overall rate has remained stable; however, the rate of major symptoms consistent with depression did increase. Directly comparing this finding to other research is limited because of how the CESD-R is scored. Consistent with the measure's guidelines (Eaton et al., 2004) a cut-off of ≥16 reflects a moderate level of symptoms consistent with depression and is comparable to other studies (e.g., Poucher et al., 2021). Where this consistency ends is the scoring of major symptoms consistent with depression. A score of >22 (which was used in the original study) stems from German population normative data and aligns with research by Nixdorf et al. (2013); however, this cut-off is not used by other researchers using the CESD. We might speculate that the hypothesised causes for the rise in depression symptoms are more evident in the rate of major symptoms consistent with depression rather than moderate or the overall rate.

Hypothesis 3: Participants under 25 years of age will experience higher mean levels of symptoms consistent with depression than athletes above 25 years of age.

The results showed there was a significant difference in depression scores between athletes under 25 and athletes over 25, with a small to medium effect size, supporting the hypothesis. This aligns with other literature (see Akesdotter et al., 2020; Beable et al., 2017; Gulliver et al., 2015). Furthermore, this finding aligns with recent research on Swedish athletes, which showed that mental health challenges had a peak onset age of 19 years and noted it was a time of many changes in personal and competitive lives (Akesdotter et al. (2020).

The average age of athletes who competed at the Tokyo 2020 Olympics was 27 years; furthermore, 90% were under the age of 30 (CEPAR, 2022, August 9). The period of life when young adults encounter numerous transitions often aligns with the age range of these athletes (Arnett et al., 2014), which can make them vulnerable to mental health challenges (Purcell et al., 2020).

This stage of life is hallmarked by social, emotional, and cognitive development and transitions, (Arnett et al., 2014; Blakemore, 2019; Thapar et al., 2022), before even considering the stressors of elite sport. In an NZ longitudinal study by Caspi et al. (2020), excluding those under the age of 18, incident rates of mental disorders were highest in participants at 21 years old (51%) and at 26 years old (48%), indicating that mental health challenges frequently occur in these age brackets.

Hypothesis 4: Participants who compete as individuals compared to those competing in a team will have higher mean levels of symptoms consistent with depression.

Hypothesis 4 argued that individuals who competed as individuals would experience higher levels of symptoms consistent with depression. This study found a statistically significant difference between athletes who competed as individuals compared to those who were part of a team. This finding supported the hypothesis and is consistent with the original study (Beable et al., 2017) and the study by Nixdorf et al. (2016).

There are many reasons why individual athletes may experience higher levels of symptoms consistent with depression. Social support, irrespective of a sporting context, is seen to play an important buffering role in the development of mental illness (Gariepy et al., 2016). Raffaelli's et al. (2013) study supported the stress-buffering hypothesis model (Cohen & Wills, 1985) by demonstrating that social support reduced the association between stress and depression in Mexican university applicants.

The nature of individual sports means that these athletes may experience increased social isolation compared to team sport athletes, thus increasing vulnerability to depression. Loneliness has also been cited as a significant variable affecting depression (Erzen & Çikrikci, 2018). Furthermore, Hanrahan and Cerin (2009) showed that individual athletes attributed failure more internally, which is logical, given that they do not have teammates to "blame" or share the loss with.

This, combined with reduced social support, could account for the increased symptoms consistent with depression seen in this group.

As this is an emerging line of research, there has been some inconsistency in the way athletes are grouped as either individuals or team sports athletes. In the original and current study, athletes who belonged to a team with less than nine members were classified as individual athletes, while those in teams with nine or more members were classified as team sports athletes. Other researchers have used different criteria, such as the specific demands of the sport (e.g., team ball sports or aesthetic sports) as a way to group athletes. For example, Schaal et al. (2011) showed that depression was significantly lower in team ball sports athletes compared with athletes in other sports categories, such as high-risk (for injury) sports or aesthetic sports. Technically, the teams in this study were all ball sports (netball and rugby); however, this was not a consideration, merely a coincidence of the study.

Hypothesis 5: Frequency and severity of hassles will be significant predictors of symptoms consistent with depression.

Evidence suggests that people who exhibit greater hassles will have an increased risk of depression (e.g., Bouteyre et al., 2007; Jung & Jung, 1989). This hypothesis argues that elite athletes would face high levels of hassles; therefore, they would display increased symptoms consistent with depression, as depicted in Figure 15. The findings showed that when the variables (age, sport type, retirement status, family history and eating disorder) were controlled for, the number of hassles accounted for approximately 21%, and the severity of hassles accounted for approximately 8% of symptoms consistent with depression.

Athletes are known to face increased numbers of stressors compared to non-athletes (Arnold & Fletcher, 2012; Hanton & Mellalieu, 2006; Nixdorf et al., 2013), so it is anticipated they would be at greater risk of developing depression (DeLongis et al., 1982; Kanner et al., 1981). This

finding concurs with other scientific evidence such as that of McIntosh et al. (2009) and Bouteyre et al. (2007).

The analysis entered the frequency and severity of hassles at different steps; therefore, it can be said that hassles frequency accounts for more symptoms consistent with depression than hassles severity. This finding aligns with Lazarus and Folkman's (1989) notion that hassles frequency tends to be a more stable measure of stress than the severity of hassles. Kanner et al. (1981) averaged scores over a nine-month period, which showed that frequency scores were stable compared to severity scores in the same study. One possible explanation was the subjective nature of assessing severity rather than an appraisal of whether an event was a hassle or not (Lazarus & Folkman, 1989).

This is a promising outcome and aligns with the Minor Events approach in that hassles show a proximal significance for health outcomes (Coyne et al., 1979, April 6; Lazarus & Cohen, 1977; Lazarus, Cohen, et al., 1980): in the case of this study, symptoms consistent with depression. This suggests that interventions aimed at reducing the frequency of hassles could be effective in alleviating depression symptoms.

Exploratory Analysis

In the following section, the discussion will focus on the findings related to the comparison analysis, as well as the findings from tests conducted to further expand the findings from the current study.

Depression Comparison

Groups Associated with Symptoms Consistent with Depression. Analysis was performed to determine whether significant correlations could be seen in those who showed symptoms consistent with depression and specific variables. These findings were compared with the 2015 findings. Sport

type was the only variable found to have a significant association, replicating the original study's results. This outcome was expected and is supported by the literature mentioned in hypothesis 4.

An interesting finding was the lack of significance for age groups and symptoms consistent with depression. As was seen in hypothesis 2, participants under 25 experienced a significant difference in depression symptoms; however, this significance was not seen using a chi-squared test. This analysis (compared to hypothesis 2) used three age groups (rather than two) and therefore had less power (Field, 2018). This may explain the difference in the result.

Groups at Risk for Symptoms Consistent with Depression. Expanding on the results obtained through the chi-squared test, the objective was to investigate whether specific groups of athletes had an increased vulnerability or increased odds of symptoms consistent with depression. Once again, the current study showed athletes who competed as individuals were at increased risk of developing symptoms consistent with depression (6.8 times higher than team players) compared to 4.2 times in 2015. As mentioned in hypothesis 4, factors such as social isolation and internalising performance can increase the risk for this group (Beable et al., 2017; Nixdorf et al., 2016; Nixdorf et al., 2013). The findings showed a large skew, as only four participants who met the depression criteria were from team sports, while 39 were individual athletes. Furthermore, this variable could not be generalised (chi-square goodness-of-fit test, p =<.001) to the population, which supports the possibility of bias and its potential inflationary effect on the finding. Despite the sample being biased, it could serve as a starting point for exploring this phenomenon with greater accuracy in the future.

The current study also showed an increased risk for athletes who were uncertain about retirement. This result is consistent with the 2015 study (despite slight differences in groupings), but the extent is not as pronounced. Transitions in sports (i.e., retirement; Knights et al., 2016; Sanders & Stevinson, 2017; Stoltenburg et al., 2011) and in general life (Arnett et al., 2014) can be an enormous source of stress for athletes. As previously noted, increased stress is associated with an increased risk of depression. The slight decrease in risk in the current study (compared to 2015) may

be explained by improved awareness of the challenges athletes face during their transition from sports. An increase in awareness has led to more research and the development of support frameworks to aid athletes during this process (Stambulova & Wylleman, 2015, 2019; Torregrossa et al., 2020)

Hassles Comparison

Comparison of Hassles Frequency and Severity. The study's findings showed there was not a significant increase in hassles frequency; however, there was a significant increase in hassles severity. With regard to frequency, athletes endorsed, on average, just over four more daily hassles in a 4 week period. Somewhat harder to relate to, athletes reported an increase in severity.

To broaden our understanding of these findings, three normative data sets, (as described by Lazarus & Folkman, 1989) were available. The samples included; Kanner, 100 white middle-class adults aged 45-64 (Kanner et al., 1981); MacPhee, 432 college students (Lazarus and Folkman (1989); and Young, 448 adults aged 20-60 (Lazarus & Folkman, 1989). In both the 2015 and the current study, hassles frequency scores were above normative data; however, hassles severity scores were below all three normative samples. This suggests that elite athletes had a high frequency of hassles; however, they viewed them as low in severity compared to normative data. While these comparisons may have offered some additional understanding, their relevance may be questionable as they were conducted a long time ago.

The ability to compare with current research in regard to increases in hassle frequency and severity is limited by many studies using a cross-sectional study design (D'Angelo & Wierzbicki, 2003; Kanner et al., 1981; McIntosh et al., 2009). There is limited research that has evaluated stressors over time; however, some possible reasons for the increase can be inferred. More often now, athletes are actively encouraged to have “dual careers” (Stambulova & Wylleman, 2015). However, it could be argued that for athletes who do pursue a dual career, balancing both priorities can become challenging or may increase the incidence of hassles (Vickers, 2018).

Another possible reason for the increase in hassles could be related to primary appraisals. As mentioned earlier, in the TMSC (Lazarus & Folkman, 1984) primary appraisal is closely related to "goal commitment". According to Zuber et al. (2022) and Zuber et al. (2015) elite athletes have a higher likelihood of succeeding if they are intrinsically goal motivated. It is possible that in situations where athletes are confronted with stressors that may impede their sporting goals, they are more likely to perceive it as a hassle, in contrast to individuals who are less motivated. However, this study did not measure the achievement level of participants; therefore, this is purely speculative.

The effects of the COVID-19 pandemic could result in persistent difficulties. At the time of this study, NZ was transitioning to "life after COVID-19", and although no restrictions were enforced, it could be contended that a "new normal" had emerged (McClure, 2021). For example, most athletes depend on travelling to compete (Flatt et al., 2019), and a reduced flight network or availability of flights may mean increased costs and financial stress (Bywater, 2022).

The high-performance sporting structure in NZ rewards performance. Since the model's inception in 2006 (Sport and Recreation New Zealand, 2006a) the pressure on athletes to perform has only increased as noteworthy results become harder to achieve (Oakley & Green, 2001). The existence of evidence establishing common athlete stressors (Reardon et al., 2019a) in itself speaks to the sheer number of elite athletes globally encountering similar circumstances, or perhaps a shared experience of being an elite athlete. There is increasing awareness about the stress that elite athletes experience.

A consensus statement by the International Olympic Committee widely acknowledges a rise in both training workload and competition for athletes (Schwellnus et al., 2016). According to the TMSC theory proposed by Lazarus and Folkman (1984) an escalation in physical load may diminish the coping resources available to athletes, thereby impeding their capacity to manage daily stressors. Even if the frequency or quantity of hassles have not increased, they are perceived more severely due to fewer mental and physical resources being available. Research by Russell et al. (2019) investigating stressors (such as media commitments, external study, sponsorship

engagements, driving, time pressures, and managing relationships) causing mental fatigue may corroborate this speculation.

Prediction of Hassles Frequency and Severity. By using regression analysis, we were able to identify the number of daily hassles that specific groups of athletes encountered, as well as their severity. Notably, athletes who displayed symptoms consistent with depression experienced a little over one additional daily hassle for every one-point increase in score on the CESD-R. For athletes who exhibited moderate symptoms consistent with depression or greater, this equated to experiencing 17 more daily hassles, which was consistent with findings in 2015. This finding aligns with previous research on the bi-directional relationship between stress and depression (Hankin & Abramson, 2001). Research suggests that individuals experiencing depression are more prone to experiencing heightened stress levels, potentially due to hassles, as investigated in this study.

It was seen that individual athletes faced 10 additional daily hassles in contrast to their counterparts in team sports. It is possible that athletes in a team operate more cohesively, sharing the sport-specific hassles among the group and benefiting from having a manager to assist with the organisation. Halldorsson et al. (2017) conducted research on the dynamics of teamwork and reported on a participant's comment regarding the positive impact of being part of a team. Specifically, the participant mentioned that being part of a team increased their energy levels, which allowed them to manage a regular job while also training twice a day.

Athletes who do not have to relocate for their sport are likely to face almost six more daily hassles than those who do not. Although this finding was not shown in 2015, there was a discussion about the advantages of athletes living and training close to their training facilities or sports centres, as it provides them with more specialised training support and potentially fewer hassles. The current study seems to confirm this hypothesis. Considering that athletes often train twice a day, residing near a sports hub would appear to be a practical choice.

As previously mentioned, social support has been shown to have a protective effect against depression (Gariepy et al., 2016). While this is speculative, social support in the form of a family may also help to alleviate daily stressors for athletes, particularly if they are younger in age.

As previously mentioned, practical interpretation of the severity of hassles is difficult. The theoretical basis for understanding hassles severity is rooted in how individuals appraise them (Lazarus & Folkman, 1984). Given the close connection between appraisals and coping, research on appraisals is often conducted when researching coping. In the present study, it was found that males appraise daily hassles more severely than females. This contrasts with the results of a meta-analysis by Tamres et al. (2002) which examined 26 studies and found that none of them demonstrated men appraised stressors more severely than women. It has been suggested that the greater prevalence of coping behaviours observed in women may be attributed to their tendency to perceive stressors as more severe. Furthermore, a study by Eaton and Bradley (2008) showed that when males and females were presented with the same hypothetical stressful situation, females rated the situation more stressful than males. Tamres et al. (2002) noted that women tended to ruminate about problems, seek emotional support, and use positive self-talk.

Comparison of Daily Hassles

One aspect of this study enabled comparison of the most frequently reported daily hassles experienced by athletes. The DHS allowed the researchers to rank 117 different daily hassles, based on the number of endorsements each received. This allowed the researchers to understand the daily hassles participants found to be most of a nuisance, and how they have changed since 2015. The three most frequently endorsed hassles are now discussed, and comparisons with the 2015 study are made. Only the 12 highest-ranked hassles from 2015 were available for comparison.

1: Rising prices of common goods. This hassle ranked number 1 and was endorsed by 73% of the participants. This hassle did not feature among the top 12 in 2015. However, this is not surprising given the current economic state globally and in NZ. Globally, the economy has been

severely impacted by COVID-19, which has a knock-on effect for NZ, now experiencing a recession (McDougall, 2021). The inflation rate was 7.7% in September 2022 compared with 4.9% in September 2021 (Stats New Zealand, 2022). At the present point in time, this hassle could be the predominant hassle in several populations, not just elite athletes.

2: Troubling thoughts about your future. This hassle was endorsed by 67% of the current sample, and in 2015 ranked as the number 1 hassle at 74.9%. As has been discussed previously, transitions away from sport and retirement can be stressful periods for athletes. Given this finding, it can be established that athletes still worry about their future; whether that is a future within sport or post-sport could not be ascertained from this question. The literature on transitions in sport is healthy, especially in regard to retirement (e.g.,Brown et al., 2019; Wylleman, 2019), and as a result athletes are supported by Performance Life coaches (High Performance Sport New Zealand, 2021), who are dedicated to working with athletes on life outside of sport.

3: Not getting enough sleep. A common stressor associated with being an elite athlete is sleep. This hassle ranked number 3, and was endorsed by 66% of the sample, and was also ranked third in 2015 at 59.8%. Sleep is vital for athletes, and if athletes experience sleep deprivation, this can be a significant source of stress. We can conclude that sleep as a hassle has had an increase in endorsement by athletes; however, it's difficult to understand why.

The current study surveyed athletes from 14 different sports, and the reasons for sleep being a hassle will vary. Consistent with other work, Sargent et al. (2014) argued that early starts were a factor, and/or late nights. Furthermore, (Juliff et al., 2015) noted that jet-lag and pre-competition anxiety have been seen to reduce sleep in athletes. At the time of the survey, athletes may have been in intense training periods, as proposed by Killer et al. (2017) and Lastella et al. (2015).

Another possible explanation for lack of sleep may be the rise of the athlete brand, and therefore social media (Su et al., 2020). These days, many athletes use these platforms to promote themselves and fulfil sponsorship deals. However, high social media use has been linked to poor

sleep in teenagers (Woods & Scott, 2016) and depression (Raudsepp, 2019). It is debated whether a lack of sleep is a function of sport or modern society (Halson, 2016). The DHS was developed prior to social media; therefore, it was not investigated as its own hassle. It is challenging to determine the underlying reason for athletes' sleep concerns, as there are multiple factors at play.

Daily hassles in the current study resembled those found in 2015, except for the "rising prices of goods". However, two stressors from 2015 were endorsed at a higher rate than any of the current stressors: "worries about the future" at 74.9% and "pressure to meet high standards" at 73.2%, both higher than the "rising cost of goods." Although the frequency of hassles has increased in the current study, due to the lower individual hassle endorsements, it would appear that a larger range of hassles are now endorsed, compared to 2015. In saying that, this finding suggests that similar hassles persist even after 7 years.

Extending the Current Study

The researchers were curious to determine whether a larger sample size would reveal any differences in the rates of symptoms consistent with depression. By including all individuals who completed only the depression measure (rather than the entire survey), the sample size increased by 18 participants from 126 to 144. The results indicated that the trend observed between 2015 and the current study continued. Specifically, there was a reduction in moderate symptoms consistent with depression but an increase in major symptoms consistent with depression. The overstatement observed may be attributed to the same factors discussed in hypothesis 2, or it could be due to the increased sample size leading to more precise findings.

Hassles in Depressed and Non-depressed Groups

The aim of this analysis was to determine whether individuals in the depressed group experienced different hassles compared to the main findings. The depressed group included participants who scored ≥16 on the CESD-R, whereas the non-depressed group scored below 15. The

findings illustrated that the depressed group endorsed different hassles and at much higher rates. For example, 96.3% of the depressed group endorsed the same hassle (troubling thoughts about the future), whereas only 58% of the total sample endorsed this as a hassle. The increased endorsement for this hassle may correspond with Beck (1964) Cognitive Theory and the Cognitive Model of Depression, which suggested that individuals who are depressed hold negative views about the future.

Not getting enough sleep was ranked the second most frequent hassle for the depressed group, which aligns with the literature on populations who are depressed. Depression frequently co-occurs with sleep disorders, and changes in sleep patterns, whether increased or decreased, can worsen depression and may play a role in its development (American Psychiatric Association, 2013; Hertenstein et al., 2019; Meerlo et al., 2008; Raven et al., 2018).

Interestingly, the depressed group endorsed hassles at much higher rates than the non-depressed group. A possible explanation is that there is a bi-directional relationship between depression and hassles. This may mean that individuals with symptoms consistent with depression find day-to-day hassles more of a challenge than individuals not experiencing symptoms consistent with depression, although this is only speculative.

Prediction of Hassles Frequency

During the 7-year period between the two studies, several new variables were found to have significant relationships with the outcome variable of hassles frequency. Our objective was to determine whether these newly identified variables (see Table 9) could account for additional variance in the outcome variable after controlling for the predictor variables from the 2015 study. After the 2015 variables were controlled for, new variables (age and retirement) were entered in at step 2; and explained a further 8% of the variance in hassles frequency. Furthermore, “retire” was significant within the model.

Athletes who were contemplating retirement or were soon to retire had to manage 13 additional hassles compared to those who were not retiring, which supports previous discussion (page 89) on the challenges of transitioning away from sports. Preparing for or facing retirement can add extra stress for athletes.

Limitations

This study has many strengths, which include the ability to use an existing methodology that allows a comparison of findings. On the other hand, it perpetuates the limitations inherent in that methodology. Known limitations of the methodology were weighed against its advantages before starting the current study, and as a result, certain compromises were made. It is important to be cognizant of these compromises when evaluating the findings. The main compromises and limitations of the study involve ethical constraints, study design, and instrumentation. The intention in this section is to discuss the challenges as they relate to the findings and future research.

Access to Original Data

A significant drawback of this study was the inability to access the original raw data. It is likely that when the original study was carried out, no provision was made for it to be replicated in the future, therefore no measures were taken to ensure the accessibility of the data. Recognising this limitation, ethical permission was obtained to ensure future access to the current data. If the study were to be replicated, access to the original raw data would enable a more extensive analysis and facilitate better comparisons. The inability to access the raw data limited the comprehensiveness of the data analysis in the current study.

Minimum Age requirements

A small but perhaps unnecessary limitation is the ethical requirement to be 18 or over to participate. As more action-type sports or “gen y” sports (Thorpe & Wheaton, 2012) are introduced to the Olympics, athletes are younger. In the current study, almost half of the athletes from Snow Sports who attempted to start the survey did not meet the age requirement and, therefore could not participate. This highlights the need to take this into consideration in the future.

Uplifts Scale

According to the theory, positive experiences in people's lives can buffer the effects of negative experiences or hassles (DeLongis et al., 1982). It is theorised that measuring both hassles and uplifts would give a more comprehensive picture of an individual's situation or better reflect the real stress levels of an individual. This study did not measure uplifts and our understanding of stress may therefore be somewhat limited. Practically speaking, adding another measure was not feasible, as the survey was already long. Nonetheless, it may be worth exploring as an option for the future, potentially by selecting a more concise measure of hassles (e.g., Udayar et al., 2021) and incorporating an uplifts measure.

Sample Representativeness and Sample Size

This desire to replicate the original study's methodological approach did result in some compromises regarding the sample's representativeness. Firstly, as noted in the original study and continued in the current study, the sample did not include professional sports such as rugby (15s), cricket and basketball. Due to their organisation’s structure, only sports where athletes were supported directly by HPSNZ were included. Therefore, the results may not represent these professional sports, and/or all NZ elite athletes.

Furthermore, to be included in this study, the sport was required to have a medical lead affiliated with HPSNZ. Given the nature of the constructs being studied, it was necessary to prioritise

athlete well-being; therefore, access to specific support staff was imperative. Due to the lack of a medical lead, Football NZ could not be included in this study, which would have bolstered team sport numbers. Additionally, Hockey NZ declined to participate in this study, further decreasing the representation of team sport athletes. Losing two major team sports decreased the sample frame, reducing the final sample size. Although there was a sample of 126 athletes with a response rate of 41%, the sample size decreased by 61 athletes compared to the original study and therefore did not generalise to the broader population.

Missing Data

The DHS uses 117 items to assess hassles. The questionnaire was placed at the end of the survey, following the demographic questions and the CESD-R. Previous research has shown that longer questionnaires are linked to lower response rates (Bogen, 1996; Yammarino et al., 1991) and that responses at the end of the survey may be processed differently than those at the beginning (Helgeson & Ursic, 1994).

Unfortunately, 23 percent of participants who started the survey did not complete it. It could be hypothesised that the length of the survey played a role in this. Worsening the issue was a criterion (replicated from the original study) only to include cases in the data analysis that completed the survey. As noted earlier, a reduced sample frame combined with almost 25% of participants not completing the survey resulted in a smaller final sample. However, the original study faced similar issues with survey completion, with the length of the DHS being a potential contributing factor. With a host of imputation techniques, both sample sizes in each study could have been increased while retaining integrity in the study outcomes.

Timing of Study

By nature, HP sports often work in a cyclical fashion, revolving around major events such as Olympic or Commonwealth Games. The priorities of NSOs vary depending on the proximity to an

event. Also, as identified by Gahwiler (2007) athletes can exhibit a lack of certainty and motivation after the Olympic Games (or other major event), also known as “post-Olympic depression”. The timing of the original study (2015) was the year before the 2016 Rio Olympics, whereas the timing of this study was two years after the 2020 Tokyo Olympics. In saying that, the study did fall in the same year as the 2022 Commonwealth Games in Birmingham. Many of the sports included in the study were competing in Birmingham, and data collection was momentarily paused while the event was occurring.

The problem with a major event coinciding with research doesn't necessarily lie in the event per se, but rather in the heightened stress levels that may arise from the event preparations. To effectively compare the results, it is preferable to conduct the study at a similar point in the cycle of major events, as hassles related to specific time periods could affect the findings differently. Furthermore, it must be noted COVID-19 was a major event that occurred between the 2015 and current studies. While the period during data collection for the current study could be considered “life after COVID-19”, lingering effects of the pandemic may have had an impact on findings; however, they will be unknown.

Survey Fatigue

Another timing issue was in relation to survey fatigue. Survey fatigue is a phenomenon that occurs when individuals are repeatedly exposed to a large number of surveys or questionnaires and become tired or less willing to participate in them (Porter et al., 2004). The research team was cognizant of the fact that athletes were required to participate in several other compulsory surveys in connection with the Commonwealth games, which may have led to survey fatigue. As previously stated, it is crucial to select a suitable time frame for data collection, both within a 4-year cycle and throughout the year.

Scoring Major Depression

Depression was evaluated using CESD-R, a highly validated instrument for measuring depression. However, two drawbacks were encountered during its implementation. Firstly, the scoring criteria for major depression may be flawed. Modern use of the CESD-R applies an algorithm to score individuals. This is to account for the breadth (not just the severity) of symptoms a depression diagnosis requires, which aligns with the DSM.

The initial study drew upon prior research within the same field and thus adopted the same scoring criteria. The moderate depression cut-off point is consistent with the CESD-R guidelines; however the major depression cut-off score was based on the work of German researchers Nixdorf et al. (2013), and therefore used German population normative data. The CESD-R has been the most common instrument used within the athlete population (Harenberg et al., 2022); however different scoring criteria make it difficult to compare findings of major depression symptomology and/or MDD. However, the moderate depression cut-off is widely used across many studies (Harenberg et al., 2022); therefore we can be confident in this comparison.

Self-Report Questionnaire

A second instrument limitation is that that the depression results reflect self-reported symptoms and not a clinical diagnosis of depression. Although the CESD-R is a popular epidemiological research tool to assess depression symptoms, it is difficult to confirm a diagnosis of depression. As reported by Hammond et al. (2013), depression rates increased when using semi-structured interviews compared to a questionnaire. However, as this is the same validated questionnaire used in the original study, there is confidence that this limitation was present in both studies, and our comparisons are accurate.

Face Validity

The face validity for the DHS could be deemed low for the population of interest. Face validity is the degree to which a tool appears to assess what it is supposed to measure (Connell et al., 2018). The DHS was designed for middle-aged adults over 40 years ago. The scale does not include many experiences that young people or athletes may relate to nowadays. For example, hassles to do with social media are not included (Wright et al., 2010). A more modern hassles scale such as the LIVES-DHS by (Udayar et al., 2021) may be a better fit with the population of interest.

Participant Recruitment

Maintaining consistency with the original study's sample frame posed difficulties in terms of participant recruitment. Participant recruitment was a laborious experience due to the increased number of intermediaries that now exist between the researchers and participants compared with the original study. With an already reduced sample frame, there were two layers of personnel between the lead researcher and participants. This made advertising and recruitment problematic. Furthermore, the strict requirements for having support services in place for participants meant that a “snowball” method of recruitment could not be used, as in a similar Canadian study (Poucher et al., 2021). The recruitment process was complicated and affected the final sample size. While not necessarily a limitation, it is a reality of conducting research with this population that more time may be required to gather a sufficient sample size.

Practical Implications

The current study validated some findings from 2015 while highlighting new findings. The findings have added to a growing body of research emerging in the area of athlete mental health and can inform mental health strategies that aim to support this population.

The demanding nature of being an elite athlete is strongly linked to stress and depression, as evidenced by significant research findings. This underscores the impact of daily stress on depression, which outweighs individual factors such as age, sport type, or retirement status that are difficult to modify. An increasing trend in hassles frequency and severity compared to 7 years ago is worrisome. Nonetheless, targeted interventions can help to address the daily challenges faced by athletes. The results of the DHS allowed the researchers to pinpoint the most common hassles, such as financial difficulties, which for example, could be tackled through focused interventions such as budgeting advice. Education and raising awareness about managing daily hassles that athletes commonly encounter can be beneficial not only for athletes but also for those who support them and guide decision making such as NSOs.

Although the overall depression rate has not shown a significant increase, individuals experiencing depression symptoms are now experiencing them more severely, according to the findings. There is a cohort of athletes (most likely under the age of 25) who are experiencing severe or major depression symptoms and require intervention. These results emphasise the importance of raising awareness and reducing associated stigma so that athletes feel comfortable seeking the help they need.

However, these findings suggest that there has not been a significant increase in overall symptoms of depression. As a result, it may be beneficial to implement more proactive measures for athletes who are not currently experiencing depression in order to prevent them from developing the condition. Similarly, for athletes who are experiencing moderate symptoms of depression, proactive measures may help prevent them from progressing to severe depression.

The results indicated that a specific group of athletes consistently displayed a correlation with the constructs being examined. Specifically, athletes who competed individually were found to be more susceptible to experiencing hassles and depression than their counterparts who competed as part of a team. Therefore, strategies to enhance social support systems for individual athletes, such as fostering a team-like atmosphere, would be beneficial.

Future Research

This study has observed a growing trend towards increased hassles and deteriorating symptoms consistent with depression in elite athletes. While replicating the 2015 study had numerous advantages, modifications to the approach and population sample in future research would enable comparisons to be made with this work and provide further insight into mechanisms that have yet to be explored. This study aimed to investigate the relationship between hassles and mood, but it remains unclear how much stress hassles can cause, what coping mechanisms individuals may use, and whether other mental health disorders may be co-existing, such as anxiety. Some suggestions on how this could be undertaken will now be discussed.

Expanding the sample frame would offer multiple advantages. The present investigation only examined athletes from the same 14 sports as the original study, limiting the potential for generalisability. Therefore, broadening the range of sports included would enhance the applicability of the findings. Moreover, it would be valuable to analyse both the original 14 sports and the larger sample, providing more options for analysis. Including more athletes from team sports, at the very least, would increase the study's potential for generalisation. Including younger athletes (< 18) would be beneficial in order to gain a better understanding of all NZ elite athletes.

The DHS is a relatively dated tool; incorporating a sport-specific stress measure could provide a more comprehensive understanding of the specific types of stressors experienced by athletes as well as their overall stress levels. To investigate hassles and their relationship with stress, a briefer hassles scale such as The LIVES Daily Hassles Scale (Udayar et al., 2021) could be used in conjunction with the Perceived Stress Scale (Cohen et al., 1983). This would provide a clearer understanding of the link between hassles and stress.

Instead of only using the CESD-R to measure depression symptoms, the Brief Symptom Inventory (Derogatis, 1975) could be used to investigate a wider range of mental health challenges (such as anxiety) in the population of interest. By using a combination of these measures, both

comparisons and new analyses can be conducted to gain a more comprehensive understanding of the relationship between hassles, stress, and mental health in the population of interest.

Finally, it would be interesting to explore whether there are barriers preventing athletes from seeking psychological support or if there is simply a lack of awareness around depression symptoms. Given that 21% of this population is experiencing symptoms of depression and this group has relatively easy access to psychological support compared to the general population, this could be helpful. Additionally, since team sports environments appear to be more effective at minimising hassles and reducing the proportion of athletes experiencing depression symptoms, it may be worthwhile to investigate whether any cultural elements in these environments could be implemented in individual sports environments.

The present research has granted permission for its raw data to be used in future studies, which presents an opportunity to gain more profound insights. Such replication would allow for a more accurate comparison of the constructs under investigation. Nevertheless, it is essential to consider the limitations of the current methodology presently employed when assessing the benefits of this opportunity.

Due to the cyclic nature of sports, especially Olympic sports (such as many in this study), it would be beneficial to repeat this study in 2027, 1 year before the Olympic Games In Los Angeles in 2028. Continuing to conduct research with this unique group will enhance our understanding and allow findings to inform future mental health strategies.

Conclusion

Elite athletes in NZ continue to experience high levels of hassles, which are associated with symptoms consistent with depression. Furthermore, athletes still grapple with many of the same daily hassles as they did in 2015, now with the added burden of financial stress. While the trend

indicates that symptoms consistent with depression are worsening, the overall rate has not significantly increased.

Pursuing excellence in HP sports can generate stressors prevalent among elite athletes worldwide. Compounding this challenge is NZ's funding model for HP sports, which historically has focused on targeting and rewarding athletes who are willing to endure these stressors and achieve results. However, recognising the impact this system was having on athletes, a more holistic approach with a focus on athlete wellbeing has now been adopted. The findings of this research may indicate that a lingering influence of the targeted model is still present.

Although the constructs under investigation showed significant relationships with only a few groups of athletes, the findings suggest that challenges can be encountered by all elite athletes. It is recommended that interventions be aimed at all athletes across all the various sports, with a focus on proactive initiatives that increase awareness and educate athletes on the challenges that are inherent in HP sports, as well as available support mechanisms. Conversely, those that support athletes need to be aware of these challenges to help foster environments that support athlete wellbeing.

The present research contributes to the existing body of literature on the psychological wellbeing of athletes and enhances our understanding of NZ elite athletes. It updates information from research in 2015 and should serve as a resource to guide current athlete mental health strategies.

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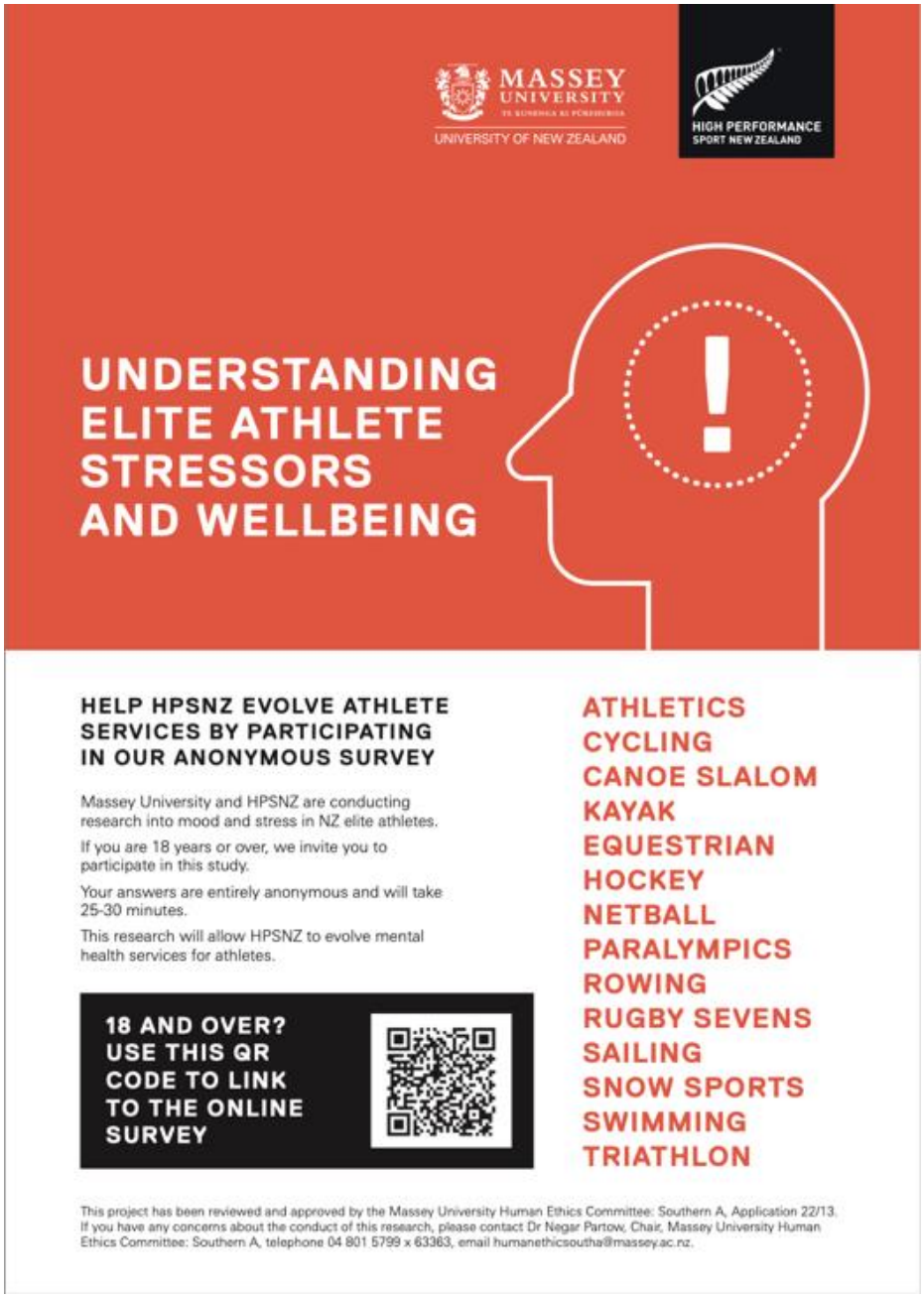
Appendices

Appendix A Marketing Poster



Appendix B Ethics Approval

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

22/05/2022

Dear: Sara Winther

Re: Ethics Application - SOA 22/13 - RATES AND RISK FACTORS OF DEPRESSIVE SYMPTOMS AND LIFE STRESS IN ELITE ATHLETES – 7 years on.

Thank you for the above application that was considered by the Massey University Human Ethics Committee:

Human Ethics Southern A Committee at their meeting held on **Tuesday, 12 April 2022**

On behalf of the Committee I am pleased to advise you that the ethics of your application are approved.

Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

Professor Craig Johnson
Chair, Human Ethics Chairs' Committee and Director (Research Ethics)

Research Ethics Office, Research and Enterprise
Massey University, Private Bag 11 222, Palmerston North, 4442, New Zealand T 06 951 6841; 06 95106840
E humanethics@massey.ac.nz; animalethics@massey.ac.nz; gtc@massey.ac.nz

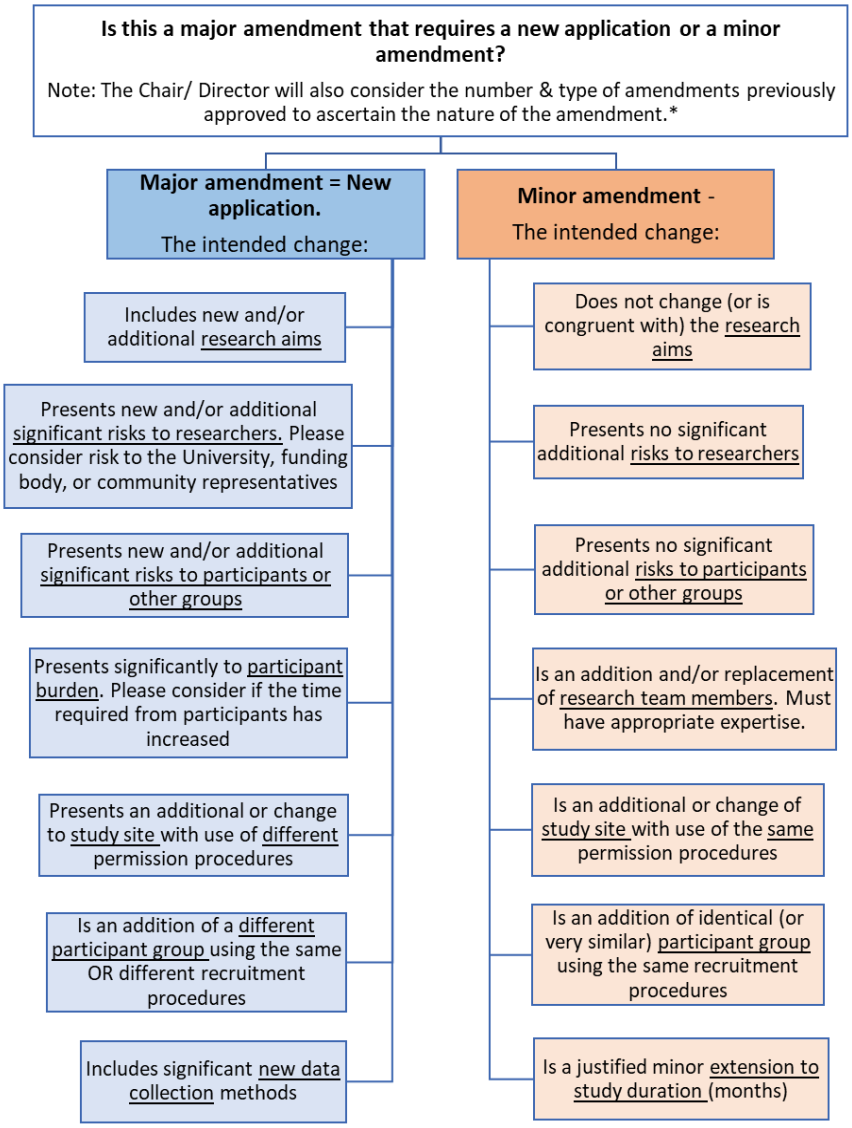
Appendix C Amendments to Ethics Approval – Minor Amendment

Submission of Amendment (variation) to a MUHEC approved study

The Chairperson of the Committee has the power to approve amendments when these are of a *minor* nature. Amendments that require *major* changes now result in the submission of a *new application*, which must be considered by a Committee at a Human Ethics Committee meeting (MUHEC). A Chairperson may request a new application is submitted after review of a minor amendment application.

For amendments to Low Risk Notifications (i.e., a project not approved by a MUHEC), please contact the Ethics Secretariat through gmhumeth@massey.ac.nz for further information.

Please refer to the flowchart below, when assessing if your amendment is major or minor:



*If your intended amendment does not fit a criteria as outlined above, please contact the Ethics Secretariat through gmhumeth@massey.ac.nz for further guidance.

Minor Amendment (variation) form to a MUHEC Approved Study

Researchers must only use the following form for Minor Amendments (as established by the Flowchart above). If it is established that your intended amendment is major, you will need to submit a new application through the Research Master system (https://rme.massey.ac.nz/).

Primary Applicant Name: Sara Winther

Application ID: **22/13**

Has your project title changed? (Please select one)

- ☐ Yes
- ☐ No

If yes, please provide the new title of your project:

Understanding Elite Athlete Stressors and Wellbeing

Please provide a brief summary of your research proposal, based on your original ethics application:

Massey University, together with High Performance Sport New Zealand (HPSNZ), will be replicating a study completed in 2015 by Dr Sarah Beable with New Zealand elite athletes researching depressive symptoms and life stressors. The current study aims to update data collected in 2015 that looked at life stressors and their effect on stress levels and mood in elite New Zealand athletes.

Does your amendment involve any of the following changes? (Please select any that apply)

- ☐ Change to completion date
- ☐ Change to personnel
- ☐ Minor change to original research aims
- ☐ Minor change to research instruments/participant material
- ☐ Change to research methodology
- ☐ Change to recruitment of participants
- ☐ Other

Approximate new completion date (if applicable):

Please list the additional members of the research team and relevant expertise for involvement in this project (if applicable):

Does your amendment involve the addition of children as participants? (Please select one)

- ☐ Yes
- ☐ No

NB: Selecting 'yes' may require the submission of a new application. Inclusion of Child participants under the age of seven or under the age of 16 without active parental consent will result in a new application.

Will changes include research being conducted using Massey Students not previously approved for: (Please select one)

- ☐ Yes
- ☐ No

NB: Selecting 'yes' may require the submission of a new application. Please refer to the Massey Decision Chart regarding research on students (at page 12).

Please provide details of the changes proposed to your original ethics application:

1. **We would like to add one extra question to the demographics section of the study. The question is:**

   Did you participate in this study in 2015? Yes/ No/ Unsure

2. **We would like to amend the title of the study.**

   Original Title: Rates and risk factors of depressive symptoms and life stress in elite athletes – 7 years on
   New Title: Understanding elite athletes stressors and wellbeing

3. **Job title of co-supervisor**

   Dr Kylie Wilson job title has changed from – Head of Performance Psychology to Mental Skill Consultant HPSNZ/ Psychology Team Lead NZOC

Why do you wish to make these changes?

1. **I had an oversight on the original application and left this question out. We would like to know how many of the participants participated in this study in 2015. The analysis of this question will depend on how many people participated originally. As this is a replication study, some of the athletes were competing 7 years ago and would have been included in the original study. If this question is approved it should be noted that participant's data from 2015 CANNOT be linked with the data from the current study.**

2. **This is just simply to make the title more understandable for a non-academic audience and attract a wider audience.**

3. **Dr Kylie Wilson's job has changed since the start of the ethics application.**

Impact of amendment on research participants

This section requires you to consider the way in which your proposed amendments may impact upon the ethical issues raised in your original application. Specifically, we ask you to outline the effect (if any) of your amendments on the following areas, and how you intend to deal with them. Please consider if your amendment affects any of the following:

1) Outcome of your research? (Please select one)

- ☐ Yes
- ☐ No

If yes, please provide further information on how your amendment effects the outcome of the research:
Adding the extra question, we will have an understanding of how many people participated in the study 7 years ago. Depending on number we may be able to draw further conclusions about how mental health has changed for this cohort. Furthermore, we may be able to compare those that did the survey in 2015 to those that did the survey only in 2022 on survey variables.

2) Current or future applications for funding? (Please select one)
- ☐ Yes
- ☐ No

If yes, please provide further information on how your amendment effects the current or future funding of the research

3) Recruitment of participants (e.g., site location, quantity, cohort, methods)? (Please select one)
- ☐ Yes
- ☐ No

If yes, please provide further information on how your amendment effects the recruitment of participants (e.g., site location, quantity, cohort, methods):

4) Change to the risk of harm (increase or decrease) to participants and/or researchers? (Please select one)
- ☐ Yes
- ☐ No

If yes, please provide further information on how your amendment changes the risk of harm (increase or decrease) to participants and/or researchers
NB: Selecting 'yes' may require the submission of a new application.

5) Relationships (if any) between researchers and participants (e.g., is there a conflict of interest?) (Please select one)
- ☐ Yes
- ☐ No

If yes, please provide further information on how your amendment relationship between researchers and participants (e.g., is there a conflict of interest?)

6) Consent from participants? (Please select one)
- ☐ Yes
- ☐ No

If yes, please provide further information on how your amendment effects the consent process of participants

7) Data collection, interpretation, storage and/or disposal? (Please select one)
- ☐ Yes
- ☐ No

If yes, please provide further information on how your amendment effects the collection, interpretation, storage and/or disposal of research data

8) Privacy and confidentiality of participants? (Please select one)

- ☐ Yes
- ☐ No

If yes, please provide further information on how your amendment effects the privacy and confidentiality of participants

9) Are you required to submit requests for amendment to any external bodies to Massey (e.g., the HDEC, HRC or another University)? (Please select one)

- ☐ Yes
- ☐ No

If yes, please provide further information regarding this process (i.e., which external bodies will be submitted to?)

10) Are there any other relevant ethical issues in relation to the proposed amendment? (Please select one)

- ☐ Yes
- ☐ No

If yes, please provide further information regarding these relevant ethical issues

---

Amendment attachments

Please attach any updated forms and public documentation for this amendment. These might include:

- ☐ Study Protocol
- ☐ Participant Information and Consent Forms
- ☐ Advertising Materials
- ☐ Invitation Letter
- ☐ Emails to participant organisations
- ☐ Questionnaire/Survey materials
- ☐ Interview Questions
- ☐ Focus Group protocol
- ☐ Funding agreements

Appendix D HPSNZ Research Ethics Approval

P +64 9 477 5420
F +64 9 479 1486
HPSNZ.ORG.NZ

17 ANTARES PLACE
MAIRANGI BAY
AUCKLAND 0632

PO BOX 302 563
NORTH HARBOUR
AUCKLAND 0751

HIGH PERFORMANCE
SPORT NEW ZEALAND

20 January 2022

Research Ethics
Research & Enterprise
Massey University
Private Bag 11222
Palmerston North 4442
New Zealand

To whom it may concern,

High Performance Sport New Zealand Athlete Mental Health Research

On behalf of High Performance Sport New Zealand, I endorse the Athlete Mental Health Research Project led by Sara Winther and Dr Ian de Terte at Massey University. I support the research team inviting HPSNZ Carded and TAPS Athletes to participate in this research under the supervision and guidance of Dr Bruce Hamilton (Head of Performance Health, HPSNZ) and Kylie Wilson (Head of Performance Psychology, HPSNZ).

HPSNZ is committed to understanding the mental health of New Zealand's elite athletes and we are looking forward to working with the research team to grow our knowledge in this area.

Kind Regards,

Fiona Mather

General Manager – Athlete Performance Support

Appendix E All Items Online Survey

By ticking this box I acknowledge that I am age 18 years or over and have read the above information, and consent to participate in this survey (check box)

1. **How old are you?**
   18-20; 21-24; 25-29; 30-34; 35+

2. **What is your gender?**
   Female; Male; Other

3. **What is your ethnicity?**
   NZ European; Māori; Pacific Peoples; Other Ethnicity

4. **What sport do you compete in?**
   Athletics, Bike, Canoe/ Kayak, Equestrian, Football, Hockey, Netball, Paralympics, Rowing, Rugby Sevens, Sailing/ Yachting, Swimming, Triathlon, Winter Sports, Other

5. **Have you moved from home to be part of a centralised programme with your sport?** Y/N

6. **Have you ever been diagnosed with depression?** Yes; No

7. **Have you ever been prescribed antidepressants?** Yes; No

8. **Are you currently taking antidepressant medication?** Yes; No; Not anymore

9. **Has anyone in your immediate family been diagnosed with a mood disorder or mental illness?** Yes/No

10. **In the past 6 months, have you sustained an injury-causing you to miss more than two weeks of planned training or racing?** Yes/No

11. **In the past 6 months, have you required surgery for an injury or illness that has required you to miss more than two weeks of planned training or racing?** Yes/No

12. **Do you currently suffer from, or have you ever suffered in the past from an eating disorder?** Yes/No

13. **Are you in paid employment other than your sport?**
    Yes – full time; Yes – part-time; Very occasionally; Not at all

14. **Do you have concerns about your alcohol intake?** Yes/No

15. **Do you think you have a substance abuse (drug) problem?** Yes/No

16. **In the past six months have you been diagnosed with a concussion?** Yes/No

17. **Are you contemplating retiring from your chosen sport in the next 12 months?** Yes/No Undecided

18. **Did you participate in this survey in 2015?** Yes/ No; Unsure

19. **If you would like to go into the draw to win one of 10 $40 petrol vouchers, please click here (button) to be taken to a separate webpage to enter your contact details. Your survey data will still remain anonymous. If you win, a voucher will be sent to you in the post.**

The Center for Epidemiologic Studies Depression Scale - Revised

Each question below has a statement. For each question, please indicate how often you have ever felt this way **IN THE PAST TWO WEEKS** by selecting the option you most agree with.

		0	1	2	3	4
		Not at all/ Less than 1 day	1-2 days	3-4 days	5-7 days	Nearly every day for 2 weeks
1	My appetite was poor.					
2	I could not shake off the blues.					
3	I had trouble keeping my mind on what I was doing					
4	I felt depressed.					
5	My sleep was restless.					
6	I felt sad					
7	I could not get going.					
8	Nothing made me happy.					
9	I felt like a bad person.					
10	I lost interest in my usual activities.					
11	I slept much more than usual.					
12	I felt like I was moving too slowly					
13	I felt fidgety					
14	I wished I was dead					
15	I wanted to hurt myself					
16	I was tired all the time					

Daily Hassles Questionnaire

Hassles are irritants that can range from minor annoyances to fairly major pressures, problems or difficulties. Hassles can occur a few or many times in any given period.

Listed below are a number of ways in which a given person can feel hassled. We know there are a few but please answer every question. As this is a validated questionnaire there will be some questions that do not apply to you. For those ones, you should tick 'None/ Did not occur'

In regards to the below statements: How much was this a **HASSLE for you in the past MONTH**

Items 1-3 of 117.

		SEVERITY			
		0	1	2	3
		None or did not occur	Somewhat severe	Moderate severe	Extremely severe
1	Misplacing or losing things				
2	Troublesome neighbours				
3	Social obligations				

The remainder of Daily Hassles Items were omitted due to copyright.

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Appendix F Participant Information Sheet

College of Humanities and Social Sciences
Massey University
Private Bag 11 222
Palmerston North, 4442

High Performance Sport New Zealand
7 Antares Place, Mairangi Bay,
Auckland 0632

Understanding Elite Athlete Stressors and Wellbeing

Information Sheet - Participants

Dear athlete,

As a supported athlete, you are invited to participate in a research study, which aims to investigate depressive symptoms and daily life hassles in New Zealand elite athletes.

Why is this research happening?
This study aims to update data collected in 2015 that looked at life stressors and their effect on stress levels and mood in elite New Zealand athletes. The anonymous survey will be accessible online as a one-off survey, and we expect will take 25-30 minutes to complete. You have been invited to participate because you are a supported athlete, 18 years or over. At the completion of the survey, you will be able to go in a draw to win one of 10 $40 petrol vouchers.

Completion of the survey implies consent. You have the right to decline to answer any particular question.

Confidentiality:
The survey will be **anonymous**, and we cannot trace the survey. Study data will be stored indefinitely in a password-protected electronic file at Massey University. Research analysis will be on anonymised data. Only the principal investigator and supervisor will have access to the data. At the completion of

the study, a summary of findings will be sent to your National Sports Organisation. Additionally, we anticipate presenting the data in relevant sports journals and relevant sports conferences. If the information you provide is reported or published, this will be done in a way that you or your answers will NOT be identifiable and will remain anonymous. If this study is replicated in the future and there is a desire to use this data to compare findings, full ethical approval will be obtained. If you consent to participate in this study, you are also consenting to researchers using these findings for future study comparisons. Participants are able to contact researchers directly for comments, but due to anonymity, individual results will not be provided.

Participation in the study is entirely voluntary. Participation/non-participation in the study will have no effect on the ongoing relationship or involvement with support staff, coaches, team doctor, psychologist and management of your sport.

Benefits and risks of being in the study:
The benefits of this study revolve around identifying depressive symptoms and associated risk factors and life stressors. Additionally, as this is a replication study, we will be comparing this data to the original study in 2015. This will benefit elite athletes in New Zealand as High Performance Sport New Zealand will look toward modifying existing interventions and or implementing further support in areas identified. This is particularly important where symptoms are interfering with performance and general wellbeing.

We do not anticipate any specific risks associated with this study; however, some questions may make people feel uncomfortable or distressed. Regardless of your responses to the survey, if you have any thoughts of self-harm or if you wish to discuss your feelings further, you should schedule an appointment with a health professional as soon as you can. This can be your primary care doctor, National Sporting Organisation doctor, HPSNZ doctor, or team psychologist.

Alternatively, if you wish to remain anonymous, contact the support groups listed below:

- Instep Assistance Program – 24/7 confidential advice and assistance call 0800 284 678 or www.instep.nz username: hpsnz password: wellness
- www.depression.org.nz
- 0800 111757 (Depression help line)
- Lifeline Free phone 0800 543 354 (free text 4357)
- www.thelowdown.co.nz (text 5626)

Conflict of Interest:

The lead researcher for this project is a former elite athlete and participated in the original study in 2015. The remainder of the research team is currently involved in the care of elite athletes.

Research Team

Principal Investigator: Sara Winther, Massey University (Master of Health Science/ Psychology)

Supervisor: Dr Ian de Terte, Massey University

Co-Researcher: Dr Bruce Hamilton, Sports Physician, Medical Lead HPSNZ

Co-Researcher: Dr Kylie Wilson, Mental Skills Consultant HPSNZ/Psychology Team Lead NZOC

Original Researcher – Dr Sarah Beable, Sport and Exercise Physician HPSNZ/ Axis Sports Medicine

Any questions?

Thank you very much for participating in this study. If you have any queries or wish to know more please feel free to contact:

Sara Winther ph: 021 448 080, email: sara.winther.1@uni.massey.ac.nz (Researcher)

Dr Bruce Hamilton ph: 021 271 1320, email: bruce.hamilton@hpsnz.org.nz (Researcher)

Dr Kylie Wilson ph: 027 599 8990 email: kylie.wilson@hpsnz.org.nz (Researcher)

Dr Sarah Beable ph: 09 521 9811, email: beable@sportsmed.net.nz (Researcher)

Dr Ian de Terte ph: 04 9793603 email: I.deTerte@massey.ac.nz (Massey University)

Te Kunenga ki Pūrehuroa

Massey University School of Psychology – Te Kura Hinengaro Tangata

Wellington, New Zealand

T +64 4 801-5799 ext 85071 : W psychology.massey.ac.nz

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern A, Application 22/13.

If you have any concerns about the conduct of this research, please contact Dr Negar Partow, Chair, Massey University Human Ethics Committee: Southern A, telephone 04 801 5799 x 63363, email humanethicsoutha@massey.ac.nz.

Consent

Participant Consent

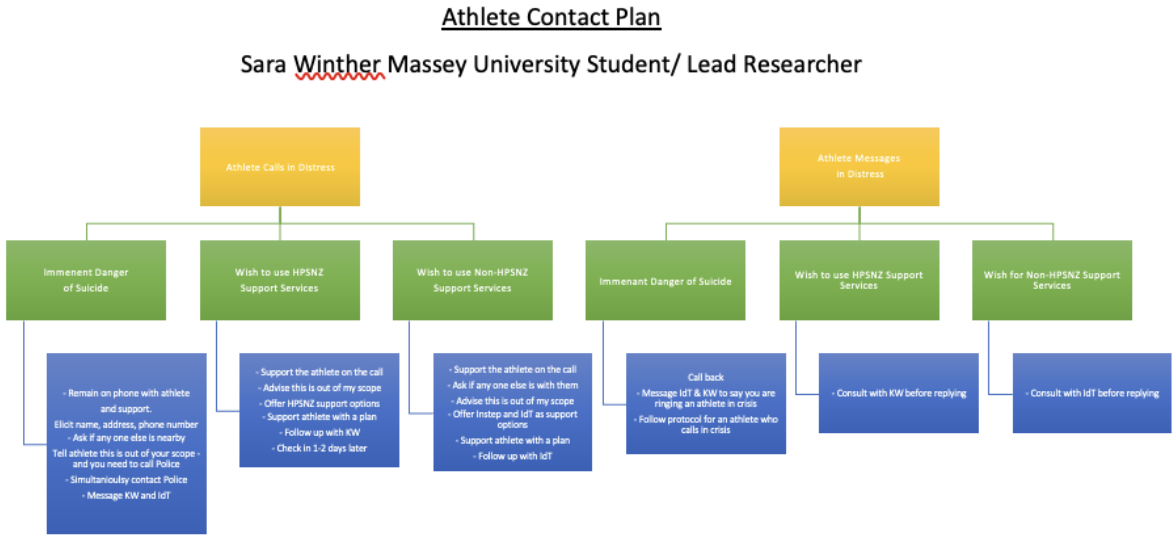
I have read, or have had read to me in my first language, and I understand the Information Sheet. I have had the details of the study explained to me, any questions I had have been answered to my satisfaction, and I understand that I may ask further questions at any

time. I have been given sufficient time to consider whether to participate in this study and I understand participation is voluntary and that I may withdraw from the study at any time.

I have read and understood the information sheet for this study and consent to collection of my responses.
I can confirm that I am aged 18 years or over.
I agree to participate in this study under the conditions set out in the information sheet.
(Please click on the 'Yes' choice if you wish to proceed.)

- ○ Yes
- ○ No

Appendix G Distressed Athlete Protocol



Note

- After all calls Sara to debrief with appropriate person.
- This document is fluid and may be adjusted as the study progresses.

Appendix H NSO Information and Email Template

Key contacts:
Dr Kylie Wilson
Dr Ian de Terte

Back-up contacts
Dr Bruce Hamilton
Dr Sarah Beable ph
Dr Warrick Wood ph

Phone numbers and email addresses have been removed to protect the identity of the research team and HPSNZ services.

Key information for a written message:
Thank you for reaching out. I encourage you to make contact with XYZ service. Feel free to contact me again if you have any more questions or concerns. Take care, Sara.

HPSNZ Pathway – M-F 8am-5pm
Auckland Performance Health Operations Team
Waikato Performance Health Operations Team
All other areas call Auckland.

Additionally:
NSO Medical Director
NSO Lead Psychologist or Team/ Individual Psychologist

Non HPSNZ Pathway
Instep Assistance Program – 24/7 confidential advice and assistance
www.instep.nz
username: hpsnz password: wellness

Other
- www.depression.org.nz
- 0800 111757 (Depression help line)
- Lifeline Free phone 0800 543 354 (free text 4357)
- www.thelowdown.co.nz (text 5626)

Understanding Elite Athlete Stressors and Wellbeing Study

Massey University and HPSNZ

Study Rational

Theory suggests chronic levels of stress can lead to depression. Research indicates that elite athletes have to manage many more stressors than their non-athlete peers at an age where they are vulnerable to mental illness.

This study is investigating if there is a correlation between stress and mood (depression) in our elite athletes and how this compares to 7 years ago. Additionally, the data can tell us if any specific demographics/ sports/ genders are more at risk than others.

Why an NSO should participate in this study?

WORLD LEADING: This study is a world-first by generating data that can be compared to 7 years ago. Employing the same broad cohort of athletes and the same study methodology. The same sports are included as originally; Athletes, Kayak, Netball, Swimming, Yachting, Hockey, Rugby sevens, Triathlon, Equestrian, Rowing and Cycling. All sports have agreed to participate.

EMPIRICAL: This is an empirical, confidential, anonymous study that is run independently by Massey University and supported and endorsed by HPSNZ. Evidence from this study will be robust - but the more participants, the better.

ATHLETE VOICE: Athletes have an opportunity to indicate what elements of being an elite athlete they find most stressful in a confidential way that can be compared across 14 other sports.

INSIGHTS: The insights from this study will give an accurate indication of depressive symptomology for this group and how it compares to 7 years ago. These results will help HPSNZ understand what action needs to be taken and how this group of athletes is tending compared to other worldwide studies.

TARGETED SUPPORT: Results will drive targeted support strategies that will benefit athletes and/or specific sports – for example, as a result of the last study, Clinical Psychology services were offered to athletes as part of their support package.

SPORT SPECIFIC: NSOs will receive sport-specific feedback if the response rate is high enough from their group of athletes. Specific stressors your athletes face could help inform decisions about the support services you offer to your athlete group. Support services that can target the area's athletes are finding difficult to manage could help decisions on where to invest funding.

MENTAL HEALTH STRATEGY: The data from the study will drive the next version of the Mental Health Strategy.

LEGACY: In 2015, 270 athletes gave up their time and participated in this study. The current group of athletes are enjoying the benefits of the results from the previous study. Athletes invited to participate will (in part) be giving back to future athletes.

Details of the Study

- The survey takes, on average, 16 minutes to complete and can be done on a computer or phone.
- You can access the study via a link or QR code.
- You must be over 18 years of age or over to participate.
- The study is completely confidential and anonymous. Only Massey University's lead researcher and supervisor will have access to the data. HPSNZ and NSOs will only receive global results.
- Athletes can go into a prize draw to win 1 of 10 $40 fuel vouchers.
- The survey closes end of August.

See the latest about the study in the HPSNZ July news.

https://hpsnz.org.nz/journal-entries/athlete-wellbeing-study-on-now/?utm_source=newsletter&utm_medium=email&utm_campaign=July_update_B&j=69907&sfmc_sub=18845265&l=1156_HTML&u=1516887&mid=514009957&jb=2&utm_source=newsletter&utm_medium=email&utm_campaign=H

Inviting athletes to Participate

An email from an HPD or similar which includes the key messages below is ideal. Typically, athletes get the email invite and participate within 24 hours. After this point, the response is very low. We are sending up to 5 reminders to engage athletes: however, the more personal and genuine the initial email to athletes, the better the response.

Email:

Dear athlete

Massey University and HPSNZ are inviting you to participate in a wellbeing survey. This is the same study our athletes were part of in 2015.

As we all know, the mental health of athletes is an important topic right now, and this study will allow crucial information to be collected on the mental health of New Zealand athletes. This study is a world first, and the more responses we can get from para-athletes, the more feedback we will get. This will allow us to tailor the support services we can offer you all.

Why should you all participate:

1. Almost 260 athletes participated in this study 7 years ago, and this data instigated many of the support services you may be using today. By participating in this study, you will help us understand what is required now and for the future, just like the athletes 7 years ago did for you.
2. The online survey takes an average of **16mins** to complete. No writing is required!
3. The data from this study will stay at Massey University; all answers are 100% **confidential and anonymous.**
4. Attached is a 1min video, which explains in more detail why this study is happening. Give it a watch!

To access the survey, please click the link below:

https://massey.au1.qualtrics.com/jfe/form/SV_6GqC7hO4E39DFr0

Or via the QR code

If you get busy while you are doing the survey, when you come back to it, you will not have to start from the beginning.

End

If you have any questions, please contact

Lead Researcher Sara Winther: Sara.winther.1@uni.massey.ac.nz
Massey University Supervisor Dr Ian de Terte: I.deterte@massey.ac.nz

HPSNZ Research Team
Dr Bruce Hamilton: Medical Lead
Dr Kylie Wilson: Mental Skills Consultant
Dr Sarah Beable: Axis Sports Medicine and original researcher

Appendix I Promotional Video

Screenshot as a sample.

Appendix J HPSNZ News

https://hpsnz.org.nz/journal-entries/athlete-wellbeing-study-on-now/

JULY 2022, ARTICLES

ATHLETE WELLBEING STUDY ON NOW

Massey University and HPSNZ are currently undertaking an online survey investigating athlete wellbeing. The survey asks athletes what they find stressful and how that may impact their mood.

The survey replicates the study undertaken by Dr Sarah Beable in 2015. To ensure robust findings, the same 14 sports (Athletics, Cycling, Canoe Slalom, Kayak, Equestrian, Hockey, Netball, Paralympics, Rowing, Rugby 7s, Sailing. Snow Sports, Swimming and Triathlon) have been invited to participate again, so that the data can be compared with data generated seven years ago.

HPSNZ Director of High Performance Steve Tew says this survey is an important opportunity for athletes to have a voice in the critical area of mental health and wellbeing.

> **"This study offers the chance for athletes to have their say, which will have a direct impact on the future Mental Health Strategy and support services available to athletes now and for years to come. The more athletes that take part, the greater the benefits for athletes and specific sports will be."**

Sport-specific and demographic trends will analysed and have the potential to highlight areas where extra support can be put in place or where current services available to athletes can be enhanced or increased.

This study is being carried out independently by former Olympian Sara Winther who is doing her master's degree in Psychology at Massey University.

The survey runs until 31 August.

Athletes from the sports mentioned are asked to speak to their HPS for a link to the online survey.

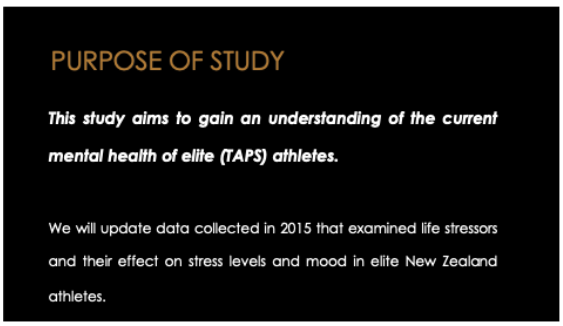
Any enquiries please contact: Principle Researcher Sara Winther – sara.winther.1@uni.massey.ac.nz.

Appendix K HPSNZ Research Presentation

1

2

3



4

5

6

DEFINITION OF TERMS

- Major depressive episode: **Meets the Diagnostic & Statistical Manual of Mental Disorders (DSM-IV) criteria**
- Moderate depressive episode: **Under the threshold for a major depressive episode, however clinically relevant symptoms present**
- Hassle – **Hassles are irritants that can range from minor annoyances to fairly major pressures, problems or difficulties.**

7

RESEARCH QUESTIONS

1. Establish the current rate and severity of depressive symptoms and life stressors in New Zealand elite athletes.
2. Compare the rate and severity of depressive symptoms and life stressors in New Zealand elite athletes between 2015 – 2022.
3. Identify any relevant and significant correlations between demographics and depressive symptoms.
4. Identify correlations between life stressors and depressive symptoms.
5. Identify how depression symptoms and life stressors have changed for athletes who participated in the original study in 2015.

8

METHODS

- This study will replicate the methods from the original study in 2015 – a cross-sectional purposive sample survey.
- A Massey University online survey platform (ITS) will be used to host and capture the data.
- Demographic questions and two psychometric measures - Centre for Epidemiological Studies Depression Revised (CESD-R) and the 'Daily Hassles' will be used to capture information associated with mood and life stressors.
- The survey will consist of 156 items and will take approximately 20-25 minutes to complete.
- All Targeted Athlete Performance Support (TAPS) athletes will be invited to participate in the study over a six-week period.
- All communication to athletes will be done via their NSO so as to not disrupt any key training or event periods.

9

ETHICAL CONSIDERATIONS

- This study is going through a full human ethics application process via Massey University.
- This study is anonymous and confidential, and any athlete can withdraw at any stage of the study.
- Athletes must consent to participate in the study.
- An information sheet outlining the purpose of the study and any risks is given to the athlete to read prior to commencing the survey.

10

ETHICAL CONSIDERATIONS - RISK

- As a consequence of researching depression symptoms, some of the questions could make an athlete feel uneasy or sad.
- To mitigate this there will be a range of HPSNZ and independent support services athletes can engage with. All HPSNZ support staff, NSOs and coaches will be advised of these support services available to athletes.
- When the athlete either withdraws or completes the survey, an independent webform will give the athlete the option to disclose their name and be contacted by a HPSNZ support staff. However, due to the survey being anonymous, we cannot unbind the data or locate details of athletes via their IP address.

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SUPPORT SERVICES AVAILABLE TO ATHLETES

- National Sporting Organisation doctor or HPSNZ doctor
- High Performance Sport New Zealand Medical Clinic 09 477 5424
- Team psychologist
- InStep Program

Or Alternatively:

- 0800 111757 (Depression help line) www.depression.org.nz
- Lifeline Free phone 0800 543 354 (free text 4357)
- www.thelowdown.co.nz (text 5626)

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2015 STUDY - SAMPLE

- 370 athletes (18 or over) identified as eligible from Athletics, Bike, Canoe/Kayak, Equestrian, Football, Hockey, Netball, Other, Paralympics, Rowing, Rugby Sevens, Sailing, Swimming, Triathlon, Winter Sports.
- 187 athletes completed the survey (50.5% response rate)
- 56% of respondents over the age of 25
- 60% of respondents were female
- 60% of respondents were from individual sports
- 53% had relocated for their sport (centralised)

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2015 STUDY - FINDINGS

- 39 athletes (21%) met the criteria for moderate depressive symptoms (14-17% general population)
  - Contemplating retirement, participating in individual sports are significantly associated with depressive symptoms
- 16 athletes (8.6%) scores reflected having experienced at least one major depressive episode
- Compared to team sports, partaking in individual sports was associated with 4.2 times higher odds of suffering depressive symptoms, nine times higher in those undecided about retirement, and four times higher in those who had decided to retire in the next 12 months.

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2015 STUDY – FINDINGS CONTINUED

- Top ranked daily hassles as reported by participants:
  - 'troubling thoughts about future'
    'concerns about meeting high standards'
  - 'concern about not getting enough sleep'
- Depressive symptoms, female gender, competing in individual sport and centralization significantly associated with increased total number of daily hassles.
- Those experiencing depressive symptoms experienced 17 more individual daily hassles and increased severity from the hassle.

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QUESTIONS

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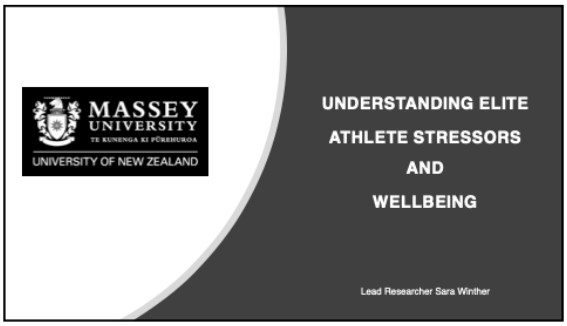
Appendix L Support Services

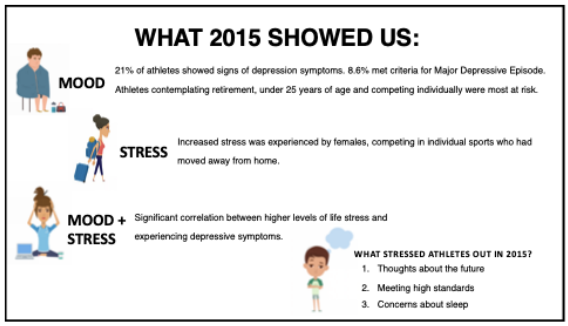
Support Services

1. Instep Assistance Program – 24/7 confidential advice and assistance call 0800 284 678 or www.instep.nz username: hpsnz password: wellness
2. www.depression.org.nz
3. 0800 111757 (Depression help line)
4. Lifeline Free phone 0800 543 354 (free text 4357)
5. www.thelowdown.co.nz (text 5626)

Appendix M HPSNZ PTL Presentation



1



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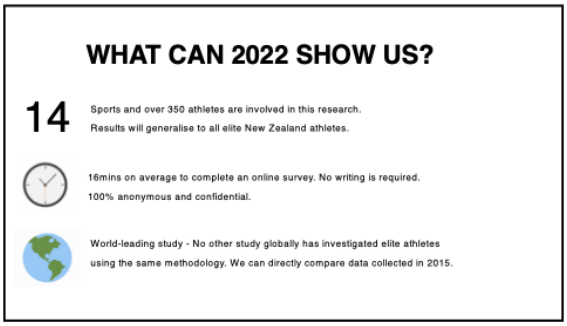
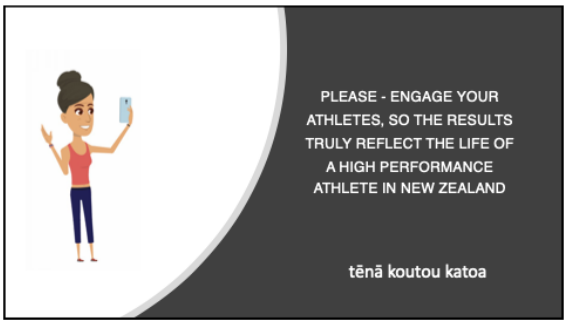


3

4

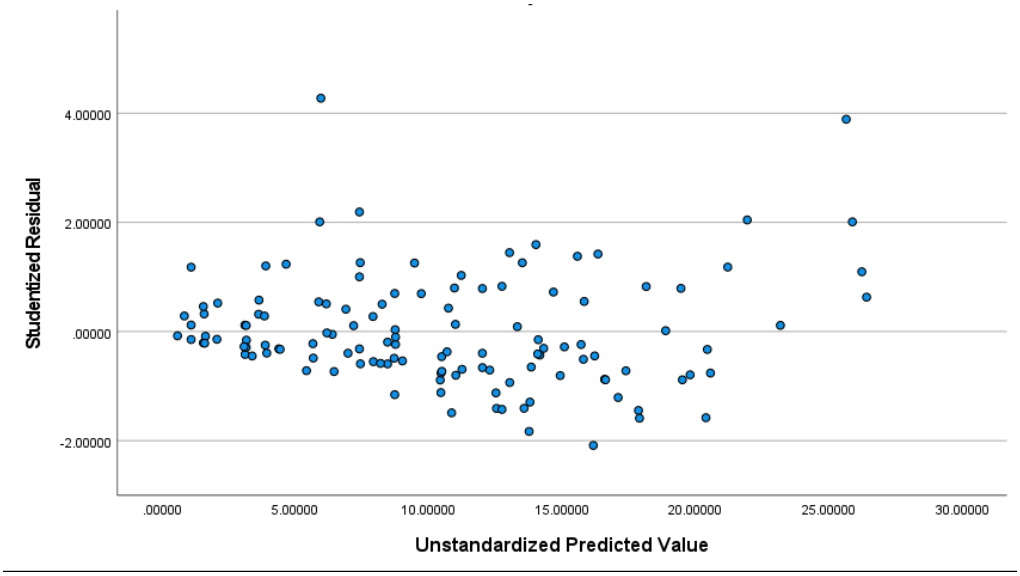


5

Appendix N Assumption Testing Plots Depression

Figure N1

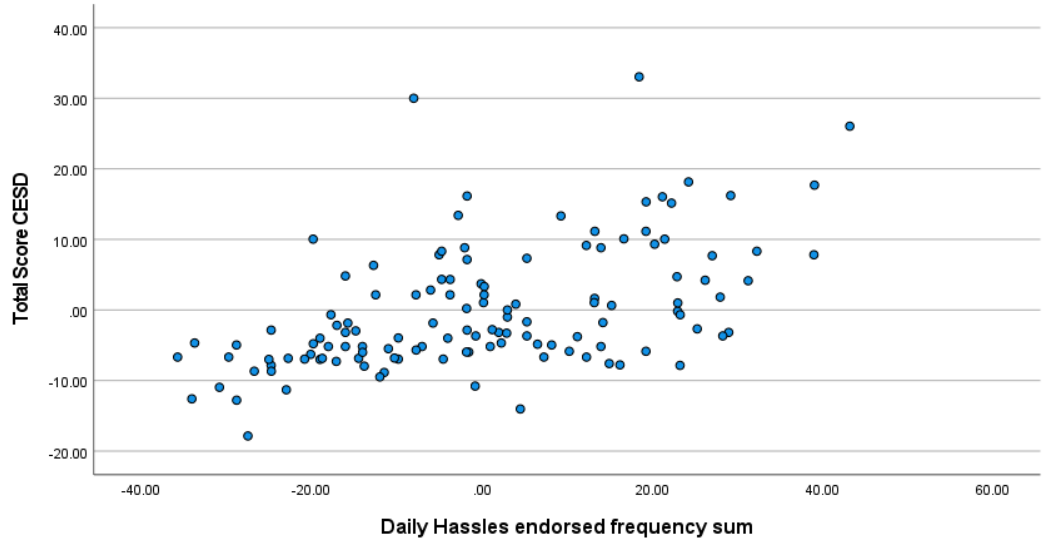
Scatter Plot of Studentized Residuals by Unstandardised Predicted Values for Hassles Frequency and Depression



Note. This figure shows that assumptions of homoscedasticity and linearity are met.

Figure N2

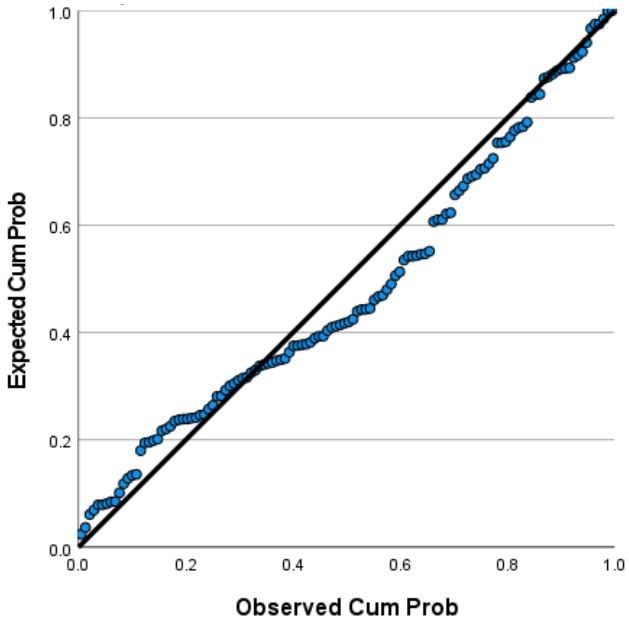
Partial Regression Plot Showing Hassles Frequency against Depression



Note. This figure shows that assumptions of linearity are met.

Figure N3

Normal Q-Q Plot of Residuals for Hassles Frequency and Depression

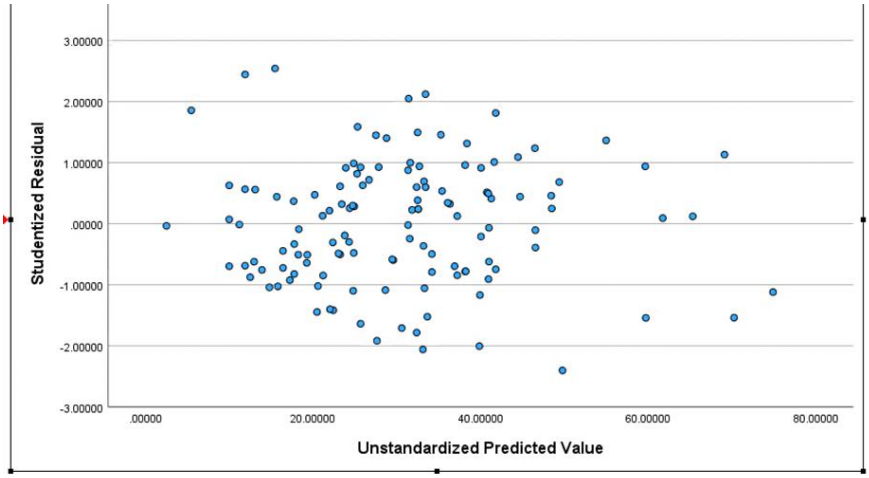


Note: This figure depicts normality

Appendix O Assumptions Testing Plots Hassles Frequency

Figure **01**

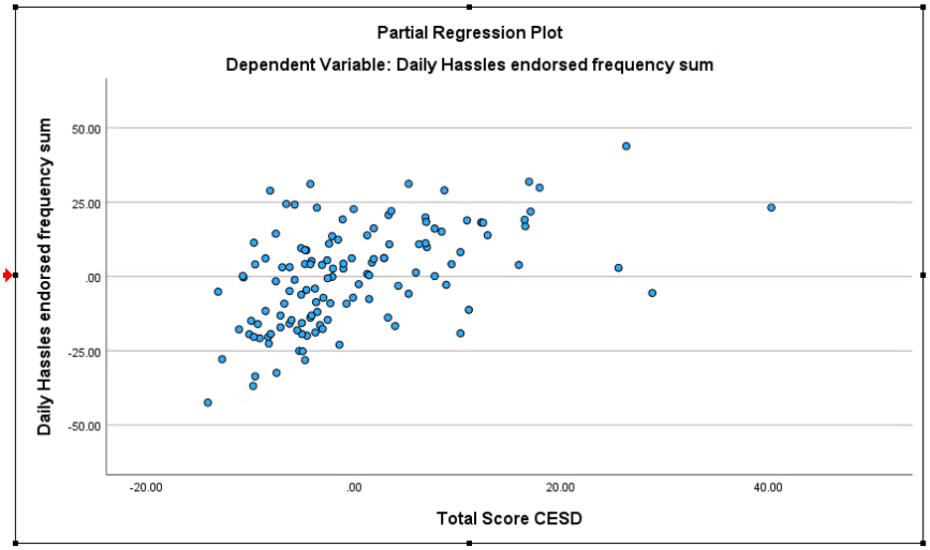
Scatter Plot of Studentized Residuals by Unstandardised Predicted Values for Hassles Frequency and Depression



Note: This figure shows that assumptions of homoscedasticity and linearity are met.

Figure 02

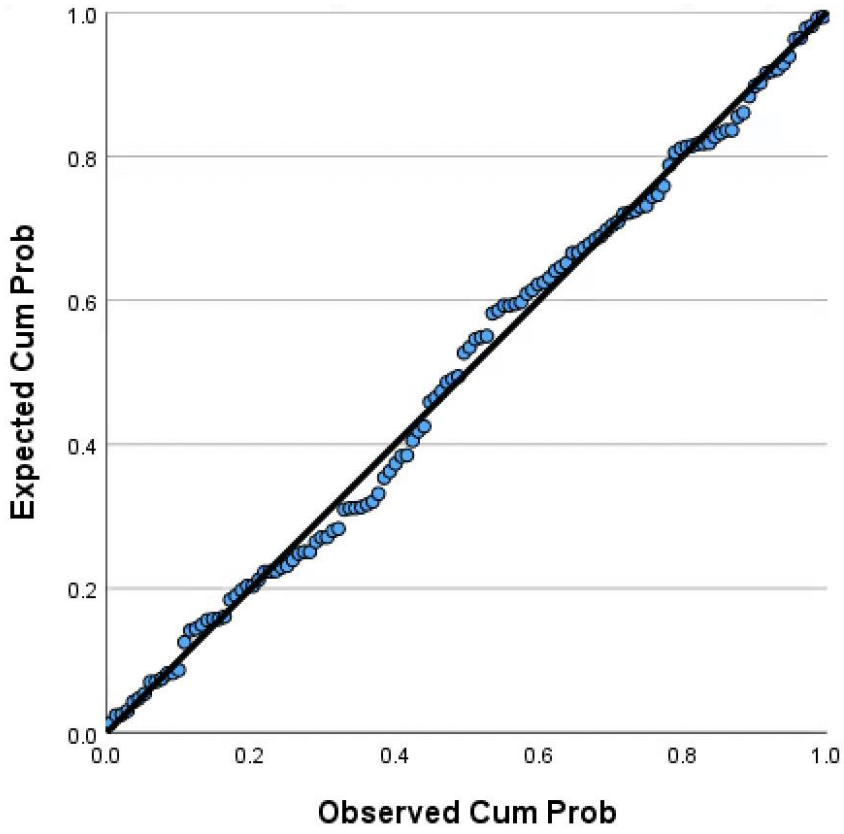
Partial Regression Plot Showing Hassles Frequency against Depression



Note: This figure shows that assumptions of linearity are met.

Figure 03

Normal Q-Q Plot of Residuals for Hassles Frequency and Depression



Note: This figure depicts normality

Appendix P Total Number and Percentage Statistics for General Health and Sport-Specific Variables

Participant in the Current Study Sample (n = 126)

Variable	*n*	%
Current Employment		
Yes	26	20.6
Part time	35	27.8
Very occasionally	24	19
Not at all	41	32.5
Total	126	100
Participate in 2015 Study		
Yes	7	5.6
No	86	68.3
Unsure	33	26.2
Total	126	100
Centralised for Sport		
Yes	80	63.5
No	46	36.5
Total	126	100
Family History of Depression		
Yes	8	6.3
No	118	93.7
Total	126	100
Past Use Antidepressant		
Yes	5	4
No	121	96
Total	126	100
Current Use Antidepressants[a]		
Yes	1	20
No	4	80
Total	5	100
Family History Mental Illness		
Yes	37	29.4
No	89	70.6
Total	126	100
Recent Injury		
Yes	41	32.5
No	85	67.5
Total	126	100

Variable	*n*	%
Recent Surgery		
Yes	13	10.3
No	113	89.7
Total	126	100
Eating Disorder		
Yes	14	11.1
No	112	88.9
Total	126	100
Problem with Alcohol Use		
Yes	4	3.2
No	122	96.8
Total	126	100
Problem with Substance Use		
Yes	1	0.8
No	126	99.2
Total	126	100
Recent Concussion		
Yes	10	7.9
No	116	92.1
Total	126	100
Will be Retiring		
Yes	11	8.7
No	97	77
Undecided	18	14.3
Total	126	100

Note: n = number of participants; % = Percentage of total participants; [a] *Skip question, based on previous question*