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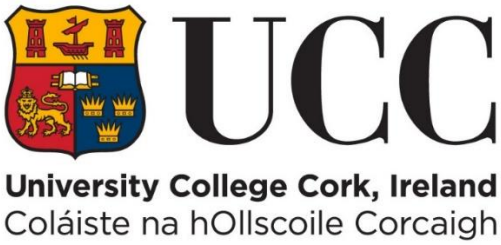
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Investigation of the challenges facing student-athletes in Irish Higher Education

Thesis presented by

Jean-Francois Gomez

for the degree of

Doctor of Philosophy

University College Cork

School of Education

Head of School: Dr Fiona Chambers

Supervisors: Dr John Bradley, Dr Fiona Chambers

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DECLARATION

This is to certify that the work I am submitting is my own and has not been submitted for another degree, at either University College Cork or elsewhere. All external references and sources are clearly acknowledged and identified within the contents. I have read and understood the regulations of University College Cork concerning plagiarism.

Signed

……..

Jean-Francois Gomez

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Non vedo l'ora di esplorare questo nuovo capitolo con te ...

Noah, cette thèse t'y est dédié: souviens toi toujours que rien n'est impossible ...

“It is the time you have wasted for your rose that makes your rose so important”

Le Petit Prince

Antoine de Saint Exupéry

Abstract

The student-athlete in the Higher Education system is confronted by multiple challenges and has to be able to manage successfully various spheres (academic, sport, social, psychological…). A wealth of academic research has investigated the student-athlete in North America; however, the same cannot be said about the research conducted among student-athletes in Higher Education in the Republic of Ireland. Drawing on a mixed method approach (initially with a qualitative method via a series of interviews, then with the integration of a self-report measure questionnaire), this doctoral thesis aims to provide a specific understanding on how student-athletes are able to balance the various struggles they will encounter while endeavouring to successfully study and compete at the same time.

The purpose of the first study aimed at investigating the challenges of combining high-level sport with academic demands. A series of interviews with nine elite student-athletes (three females, six males) indicated that each student-athletes had developed and adopted various distinct approach towards training management. Most of the student-athletes interviewed experienced different levels of setback in their study and athletic performance due to overtraining or burnout. This study highlighted the need to create a dedicated support network in order to educate and empower student-athletes and coaches.

As these struggles are multi-layered and specific to the student-athlete persona, the second study of this doctoral thesis is a longitudinal study aimed at monitoring student-athletes stress and recovery levels over an academic semester. The aim of this study was to provide an insight into the various stressors affecting the stress

recovery state of these student-athletes. Nine student-athletes (4 females, 5 males) completed the stress and recovery questionnaire from Kellmann et al. (2001) over the course of 12 weeks, which resulted in 108 filled in questionnaire. The results of this study were twofold: firstly, it indicated the student-athlete population having to face multiple stressors over the course of 12 weeks as the student-athletes taking part in this study were exposed (at key times) to high level of stress (conflicts/pressure, fatigue and emotional stress) and decreased level of recovery (which resulted in a state of under recovery and therefore potential overtraining). Secondly, the outcome of this study highlighted a lack of internal validity by some of the subscales and revealed the need to investigate the questionnaire used for this study and realign it in accordance with the Irish student-athlete population needs and specificity.

The third study of this thesis investigated via statistical analysis, the reliability and suitability of the stress and recovery questionnaire used in the second study of this thesis. 174 student-athletes completed this questionnaire anonymously once. A Principal Component Analysis (PCA) followed by a Varimax rotation was used for the General and Sport Specific parts of the questionnaire. The results of this study indicated a lack of suitability of some of the subscales and suggested an improved model fit suitable to the Irish student-athlete population.

The fourth and final study aimed at capitalising on these findings by examining and validate via a statistical analysis the improved model fit suggested in the previous chapter of this study. In order to conduct a new and independent study, a new sample of 165 student-athletes filled in the 39 questions, 12 subscales of the new

model fit questionnaire suggested in the previous chapter. An Exploratory Factor Analysis (EFA) with maximum likelihood was conducted to verify the adequate loading of the subscales across the stress and recovery structure and the strength of the correlations between the subscales. The results of this statistical analysis indicated an acceptable level of internal consistency and a satisfactory factorial validity of the 12 subscales. In accordance with the current academic research, the subscales showed relevance and sensitivity to some of the main stressors affecting the student-athletes therefore indicating the suitability of this self-report monitoring instrument adapted to the student-athlete.

Keywords: student-athletes, Irish Higher Education, stress and recovery, time management, self-report questionnaire, wellbeing.

CHAPTER 1

Introduction

"Student-athletes are young people in transition, developing individuals who, like the rest of us, must confront the formidable challenges of modern-day life in their own distinctive ways"

(Etzel et al., 1996, p. 3)

1.1 Context and Motivation

While working closely with student-athletes in the area of strength and conditioning, I quickly realised (from an anecdotal point of view) that quite often, first year student-athletes would start their academic year with a high level of enthusiasm and idealism. However, a couple of months into this academic semester, they would be relocating their focus to the academic studies (at the expenses of their athletic training). After probing the student-athlete on the cause of their behaviour, they would always mention the need to prioritise academics (as obtaining a degree is the primary goal). Similarly, I would realise that many student-athletes, in the period leading to exams or assignments would harbour distinct signs of athletic weariness and tiredness. Many conversations with these student-athletes always lead to the same reasoning: they were trying "at all cost" to manage athletics and academics while at the same time completely disregarding the recovery process.

I started to look into the depth of the academic research addressing the topic of the student-athletes in Ireland and realised, that despite a wealth of research conducted on the student-athlete in North America, a gap was present in that field as no meaningful academic research was conducted in this specific area in the Republic of Ireland. The first qualitative study (Chapter 3) aimed to understand in what ways student-athletes were able to balance the three spheres (academic, athletic and social) and overcome these struggles that are inherent to the life of a student-athlete (see figure 1.1). The study highlighted the student-athletes being

exposed to various stressors, which steered the next step of this research towards a deeper look into the stress and recovery balance of these student-athletes over an academic semester (Chapter 4). It gave me to opportunity to not only build on years of anecdotal observations but more importantly to provide a more granular context to the first study.

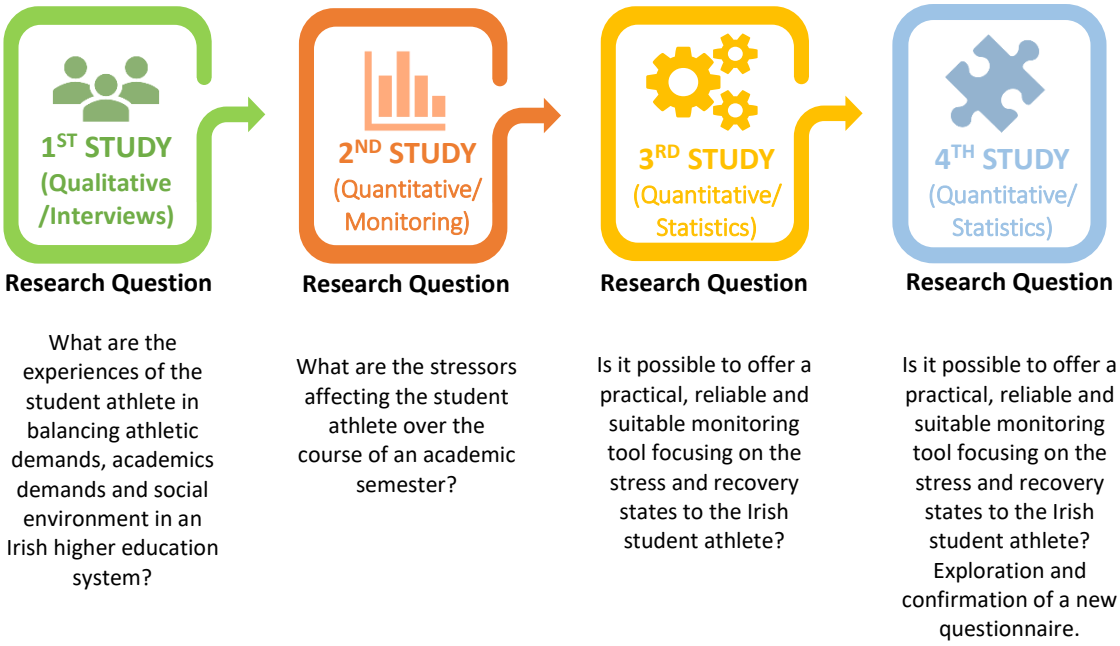


Figure 1.1 Studies pathway

The Recovery Stress Questionnaire for Sport (RESTQ-Sport 52) from Kellmann et al. (2001) provided the necessary tool to conduct this longitudinal study as this self-measure report is designed to monitor the athlete stress recovery state. In light of the feedback and the results of the second study, I realised the monitoring tool I was using was undeniably useful but lengthy and cumbersome. A logical outcome was to try to make this monitoring tool more relevant to the student-athletes'

requirements and stressors. The third and fourth studies of this thesis (Chapter 5 and 6) are the consequences of this realisation as I investigated the validity and reliability of a self-measure monitoring instrument aimed at the student-athlete in Ireland.

The overall aim of the thesis is to address a gap in the academic literature regarding the struggles encountered by student-athletes in a Higher Education institution in the Republic of Ireland.

1.1.1 Insider or Outsider Status?

Social research encompasses (within a shared space) an exchange of ideas and opinions between participants and researchers as it allows researchers to reflect, explore and expand the field they are studying. The 'insider/outsider' status has long been a subject of debate and research among scholars (Merton, 1972; Bondi, 2009; Dwyer et al., 2009; Bourke, 2014; Ryan, 2015). According to Dwyer et al. (2009, p. 58), the status of insider gives the researcher a level of trust from the participants as the uniqueness of shared commonalities allows for greater insight and access to the participant's experiences. However, the outsider status can provide the researcher with a greater collection of data due to their unique vantage point (Ryan, 2015). With many arguments in favour or against, the 'insider/outsider' status presents a stimulating challenge to the researcher and the interpretation of data.

As someone working closely with a wide variety of student-athletes, I had (and still have) the opportunity to witness first-hand the recurrent struggles of these student-athletes. As my unique position would naturally create an insider status to this research, I was very much cognizant of any potential biases. From the very early onset of this research, I adopted a position that can be described as open and authentic with a deep interest in the way student-athletes perceived their environment. Upon reflecting on my research process, I would argue that my insider status provided me with a unique advantage to engage with student-athletes in the quest to answer the first research question. Then again, the insider status can offer a position of weakness as shared assumptions between the researcher and the participant can lead to a lack of data exploration (Chavez, 2008). As I could not obtain an outsider status, a quantitative approach was used to answer the remaining research questions and provide more depth to the already existing data from the first study. Such an approach allowed for a neutral and greater perspective into the student-athletes struggles.

1.2 Aims of the Thesis

The student-athlete has been the subject of in-depth scrutiny since 1960 (Stambulova et al., 2009) but despite the growing amount of interest and academic research on the student-athlete topic, to date, most of the body of research has been conducted on North American collegiate athletes. Although a significant interest in this area is emerging among the European nations since 1990, to date very few academic studies have investigated the various challenges faced by the

student-athlete in the Republic of Ireland in a third level institution. There is an active academic research interest investigating the levels and implications of physical activity among young children in the Republic of Ireland (Kelly et al., 2005; Dobbins et al., 2009; Woods et al., 2010; Bradley et al., 2013; Belton et al., 2014; Chambers et al., 2014; Murphy et al., 2015; O'Brien et al., 2017; O'Brien et al., 2018). However, the unique population that is the Irish student-athlete in a third level institution has been, up to now, neglected in terms of academic research.

The dual career student-athlete topic (a topic that designate people faced with the challenge to combine two careers) has shown a growing interest within the European community as various initiatives aimed at supporting student-athletes have been developed by the European Union in recent years (European Commission, 2012; Pato et al., 2014). Recognising the need to support the student-athlete in both the classroom and their athletic career, the European Union have developed guidelines to promote the development of national policies aimed at supporting dual careers athletes. However, EU Member States have adopted a fragmented approach, which in turn offers contrasting support towards the student-athlete (Aquilina, 2009; European Commission, 2012). The student-athlete with specific characteristics and inherent complexity is not only a student but also an athlete at the same time and above all a person (Pato et al., 2014). Faced with long hours of athletic training, traveling and competitions as well as constant academic pressure, the student-athlete is faced with unique challenges linked to academic, athletic, social and psychological (Pinkerton et al., 1989; Parham, 1993;

Etzel et al., 1996; Ferrante et al., 1996; Papanikolaou et al., 2003; Wylleman et al., 2004; Drew et al., 2018).

In order to address a gap in the literature and to provide a greater understanding of the struggles faced by the student-athlete in an Irish third level institution, the aim of this thesis is to answer the following research questions:

1. What are the experiences of the student-athlete in balancing athletic demands, academics demands, and the social environment in an Irish higher education system?
2. What are the stressors affecting the student-athlete over the course of an academic semester?
3. Is it possible to offer a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student-athlete?

1.3 Background of the Research

1.3.1 Thesis Structure

In order to examine the research questions, this thesis was divided into several chapters. As no research to date has been conducted to investigate the balance between the academic, sporting and social sphere among the Irish student-athlete

in a Higher Education institution, it was crucial to start the thesis by examining and developing this research area. Chapter 3 describes the First Study of this doctoral thesis and is centred on the life story of these student-athletes and the way they are managing their experience and life transition over the few years studying in an Irish Higher Education institution. A qualitative method was used in order to understand the student-athlete knowledge and practices. This approach takes into account the participants' perspectives and frame of reference to form (with the researcher reflections) an understanding of the social concept (Flick, 2009).

The aim of Chapter 4 of this thesis outlines the Second Study of this doctoral thesis focus on investigating the various stressors affecting the student-athletes and the quality of any associated recovery activities undertaken by them. In order to achieve this investigation, a longitudinal study was conducted with nine student-athletes over an academic semester (12 weeks). This cohort was asked to complete every week a monitoring questionnaire (the recovery stress questionnaire from Kellmann et al. (2001)) to assess their stress recovery state.

The usefulness of this self-measure monitoring tool to identify the stress recovery state of the student-athlete was demonstrated in Chapter 4, however, the feedback collected during the longitudinal study highlighted the need for a more adapted and suitable monitoring tool in line with the student-athlete requirements and specificities. Chapter 5 of this thesis focused on exploring the suitability of a stress recovery questionnaire adapted to the Irish student-athlete and therefore a

statistical analysis looked to identify which subscales of the questionnaire were more relevant to the student-athlete.

Chapter 6 and the Fourth Study of this doctoral work is dedicated to confirm the usefulness and relevance of the subscales identified in the previous chapters. An original statistical analysis with a new sample of student-athletes was performed and interpreted. This chapter also addresses the relevance of the confirmed subscales in relation to the Irish student-athlete.

1.3.2 Significance of the Study

There is a lack of insight and research into the challenges facing the Irish student-athlete in a Higher Education institution. A greater understanding of the way the student-athletes are dealing with these challenges, linked to a more granular view of the stressors affecting the student-athlete population can provide a greater awareness of the challenges awaiting them. A self-report measure tailored on the Irish student-athlete, designed to inform coaches and athletes on the stress recovery state can potentially lead to student-athlete support programmes, which foster greater lifestyle balance with an improved academic, athletic and wellbeing state.

CHAPTER 2

Literature Review

2.1 Overview

In order to provide some context to the various challenges faced by the student athlete, the following section will provide an overview of the existing literature that relates to the student-athlete from a territorial perspective and will then offer a practical overview of the various impacts of stress on the student, athlete and student-athlete.

The term dual career was first introduced in the White Paper on Sport (European Commission, 2007) and would cover all the necessary requirements to allow athletes to develop a successful elite sporting career while pursuing and combining education and/or work. Various stages are parts of this dual career and would take place over a period of 15 to 20 years (Wylleman et al., 2004; European Commission, 2012). The term student athlete can be found under the dual career terminology.

2.2 The Student-Athlete Support System: a Territorial Conundrum

The socio-cultural perspective and economic context of the athletic and academic environment hugely influence student-athlete support: as for example the North American system, with the National Collegiate Athletic Association (NCAA), created in 1906 to looks after and manage the wellbeing and classroom success of more than half a million student-athletes (National Collegiate Athletic Association, 2018). This association generated more than $ 1 billion in revenue in 2016 - 2017, which can in turn, provide substantial re-investment into support programs aimed at the student-athlete. However, despite recent academic research in Europe investigating the complex student-athlete characteristics and specific initiatives linked to various

political recommendations to the States Members (European Commission, 2012; Pato et al., 2014), a divergent approach still remains between the State Members. This scattered stance leads to a vast spectrum of supports going from insignificant to legislatively enforced structure (Aquilina, 2009). The guidelines to action recommended by the European Commission (2012) express the need to develop a cross-sectorial cooperation between NGB's, education institution and governmental agencies.

The Republic of Ireland is considered as a "laissez-faire" state in relation to the support for the student-athlete with no formal structure in place (Aquilina, 2009), and an educational system lacking a unified and cohesive approach towards a student-athlete support system. Any student-athlete wellbeing and support program relies on the hosting higher education institution provision and willingness to develop an integrated support system. As there is no nationwide coordination and concertation between the Higher Education institutions, such a system inevitably leads to a varied student-athlete experience. For example, some Irish universities have developed some in-depth support program (such as the Quercus in University College Cork and Astra in University College Dublin) while some other universities would have a less developed support system.

In light of these varied structural, economical and sociocultural backgrounds, experiences from a first year student-athlete in an American, French, Russian or Irish third level institution would vary greatly. While it is crucial to understand the

various challenges faced by student-athletes from a macro perspective, it is even more important to contextualise the research via a culture centred approach as it allows for the development of a cultural framework and to become socio-culturally cognisant (Stambulova et al., 2009; Lupo et al., 2015).

2.3 The Student-Athlete: a Hybrid Creature in an Ever-Changing Society?

The student-athlete has been recognised in the literature as a complex character with multiple needs and stressors (Pinkerton et al., 1989; Etzel et al., 1996; Carodine et al., 2001; Watt et al., 2001; Miller et al., 2003; Aries et al., 2004; Wilson et al., 2005), and his/her dual character has been compared to mythical creatures such as the Centaur or Minotaur (Pato et al., 2014). The student-athlete, part student part athlete but beyond all a person, is expected to balance academic requirements ranging from 20 to 30 hours per week and the same amount of time practicing and competing in their chosen sport (Aquilina, 2009, 2013). Academic research has shown that student-athlete motivations fluctuate between countries. For example, the student-athlete in North America is often struggling with academic demands (Adler et al., 1985; Aries et al., 2004), while some student-athletes in Australia do not hesitate to shift their focus towards sports at the detriment of academicals requirements (Cosh et al., 2014). Inversely, some student-athletes in Europe have a tendency to view education as important as their sporting career (Aquilina, 2013). Academic research in the Republic of Ireland investigating the student-athlete topic is extremely scarce. Two studies have looked at the student-athlete from a wellbeing standpoint (Drew et al., 2018; Sheehan et al.,

2018) but so far, no research has been conducted regarding the ability of the Irish student-athlete in a Higher Education institution to successfully combine sport and education (Stambulova et al., 2018). The two studies that investigated the Irish student-athlete focused on mental health and psychological monitoring (Drew et al., 2018; Sheehan et al., 2018). These studies highlighted overwhelmingly the propensity for Irish student-athletes to develop symptoms of depression and anxiety. Drew et al. (2018) conducted research among 185 student-athletes and reported that 31% of them showed moderate to severe symptoms of anxiety. These findings resonate with a study conducted in North America where Hwang et al. (2016) investigating the perceived stress across 19 967 student-athletes: the outcomes of that study showed that the main stressors were related to wellbeing, academics and social context.

While the two Irish studies are predominantly investigating the wellbeing among student-athletes, the results highlight the Irish student as a specific population inclined to have a disturbed wellbeing state due to the exposure to various stressors. Defined by the World Health Organisation (WHO) as the ability to cope with the normal stress of life, a healthy wellbeing state allow the individual to work productively and make a contribution to society (World Health, 2004). Multiple studies have shown the importance to empower student athlete with various tools (such as yoga, mindfulness, mental skills techniques) in order to alleviate stress and regulate the wellbeing state (Denny et al., 2009; Beauchemin, 2014; Goodman et al., 2014; Dubuc-Charbonneau et al., 2015, 2018).

2.4 A (Very) Brief Historical Aspect of Stress

The stress syndrome was initially defined as a bodily process response initiated by either physical or psychological demands on an individual (Selye, 1956). Evolving from the work of Yerkes et al. (1908) which investigated the relationship between arousal and performance, Selye observed that a response pattern of systemic stress is linked to the exposure to a series of stimulus events and therefore can be defined as "the non-specific response of the body to any demand made upon it" (Selye, 1974, p. 137).

However, Selye and his response-based model received criticism as researchers and psychologists viewed stress as a multi-layered, complex problem. Selye's works focused on the physiological reactions to stress but gave little attention to it from a psychological standpoint. A distinction was introduced in the early 1970's between a stress response initiated by a negative (distress) or a positive (eustress) emotion (Selye, 1974): the realisation that homeostasis (a term coined by Cannon (1929) to define the psychobiological self-regulation) could be positively disturbed by stress, (and at fortiori positively impact on athletic performance) became a cornerstone in the development of sport psychology (Papathomas, 2007).

Another important cited research in the area of stress is Richard Lazarus's cognitive-motivational-relational theory. Lazarus explains how cognition, stress and emotion are interconnected: his theory of stress and coping (Lazarus, 1966; Lazarus et al.,

1984), hinges around one's ability to cognitively appraise and categorize a situation in order to respond to it from an 'elicit arousal' and emotional standpoint. Therefore, the same stressor might affect two individuals in different ways as the response to the perceived stimulus is based on 1) their ability to subjectively perceive the stressor(s) and 2) their coping abilities to successfully manage the imposed challenge(s) (Folkman et al., 1980; Lazarus et al., 1984; Folkman et al., 1986). Lazarus, therefore, considers the appraisal of emotions to be a key factor in stress and coping which will directly influences a person's wellbeing.

2.5 The Student and Stress

A significant body of research indicates that students will be confronted by substantial levels of stress during the course of their studies in a third level environment (Nagelberg et al., 1980; Dunkel-Schetter et al., 1990; Fisher, 1994; Murphy et al., 1996; Misra et al., 2000; Aherne, 2001; Drew et al., 2018). The transition between secondary school and the third level is one of the most challenging times for students, as some of them can be facing anxiety and depression (Stewart et al., 1997; Wong et al., 2006; Rayle et al., 2007; Banerjee et al., 2016; Galante et al., 2018) due to a high level of stress. However, others stressors such as time management (Misra et al., 2000), academic stress (Abouserie, 1994), financial difficulties, new responsibilities, speaking in public, sleeping habits and dealing with class workload (Ross et al., 1999; Bulo et al., 2014) are part of the arrays of stressors affecting the students on a regular basis. Above

all, time management is closely linked to stress and academic performance (Macan et al., 1990; Misra et al., 2000) as well as academic stress at times of exams and assessment (Britton et al., 1991; Abouserie, 1994). One of the major sources of increased stress identified by students is related to studying but more specifically to assignments and essays (Misra et al., 2000). The time constraint and the associated increased stress experienced at that specific academic period is rated as one of the top three stressors experienced by students (Robotham et al., 2006).

Within the Republic of Ireland, Aherne (2001) via a series of interviews with third level students in an Irish university, identified various stressors among students: academic stress (over-identification with academic success), social inadequacy and conflict with parents. With similar outcomes, a survey conducted at a national level among the 21 third level colleges in Ireland, showed that the main sources of stress for two-thirds of the students were from academic demands and financial stress (43%) (Hope et al., 2005). These findings from Aherne (2001) and Hope et al. (2005) are similar to the trends already highlighted in the academic research conducted among various student-athletes in North American universities (Etzel et al., 1996; Wilson et al., 2005; Dubuc-Charbonneau et al., 2014; Hwang et al., 2016).

Recently, Deasy et al. (2014) investigated the level of psychological distress (which has been defined as an emotional response to stress by Horwitz (2007)) among a Higher Education institution within the Republic of Ireland. Their findings highlighted that not only 41.9 % of students suffered from psychological distress but also the majority of these students are reluctant to seek professional help

(Dooley et al., 2012; Deasy et al., 2014). The various stressors identified in this study are identical to the one highlighted previously and are centred on studies, financial and social pressure.

2.6 Stress and the Athlete

Training sessions and the physiological stress resulting from the intensity, duration and the type of training will affect the athlete homeostasis (Figure 2.1). The various training sessions occurring over an athletic season are designed to trigger a physiological reaction to stress by creating a level of exercise-induced adaptation on the various functions of the human body (Hausswirth et al., 2013). One of the immediate outcomes of a training session is fatigue, a phenomenon widely viewed as multi-layered and multi-factorial (Halson, 2014) and can be explained by a variety of factors (Phillips, 2015). However, the ability to monitor fatigue is an essential part of training, as an efficient and proactive approach towards it can allow athletes and coaches to optimise training loads in order to prevent over and undertraining. Successful monitoring of the athlete will allow for an appropriate use of the training stimulus at optimal times, managing fatigue, and preventing stagnation or overtraining (Plisk et al., 2003).

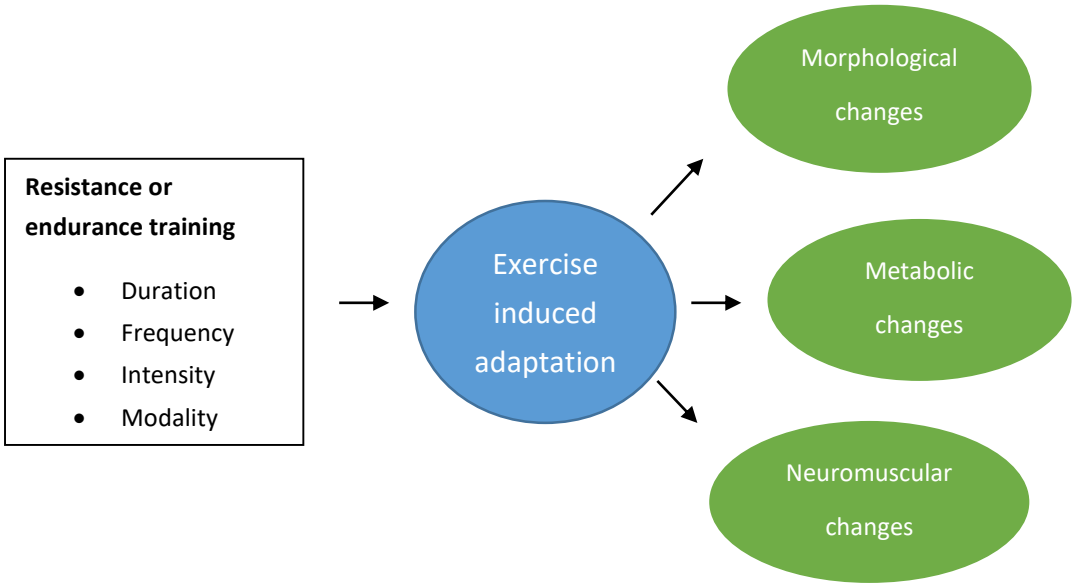


Figure 2.1 Training stimulus and changes in the body, source Hausswirth et al. (2013)

2.7 Student-athlete and Stress

The student-athlete persona and the inherent athletic demands can add an extra layer of stress (Humphrey et al., 2000; Kimball et al., 2003; Papanikolaou et al., 2003) on the individual. Humphrey et al. (2000, p. 41) categorised the causes of stress impacting the student-athletes: (a) academic problems, (b) athletics demands, (c) time, (d) relationships with others, and (e) finances. Among those causes, one of the most prominent stress factors for student-athletes is test anxiety: frequently named as a concern in the area of academic tests and examinations, the dedication of time and mental energy to academic requirements triggers stress in 95 percent of male athletes and 86 percent of female athletes (Humphrey et al., 2000). Stress at times can become so pressurising than 10 % of

student-athletes would require counselling (Hinkle, 1994). As clearly identified by scholars (Selye, 1956; Lazarus, 1966; Lazarus et al., 1984), stress can have negative consequences both from a physiological and psychological standpoint. The consequences of stress for student-athletes have been categorised as follows (Humphrey et al., 2000, p. 43): (a) impact on mental/emotional health, (b) impact on physical health, (c) negative impact on athletic performance, and (d) negative impact on academic performance. Stress can impact individuals on a variety of levels (Figure 2.2); however, student-athletes have a complex profile as they are not only students but athletes at the same time and therefore experience stressors relative to their unique status (Wilson et al., 2005).

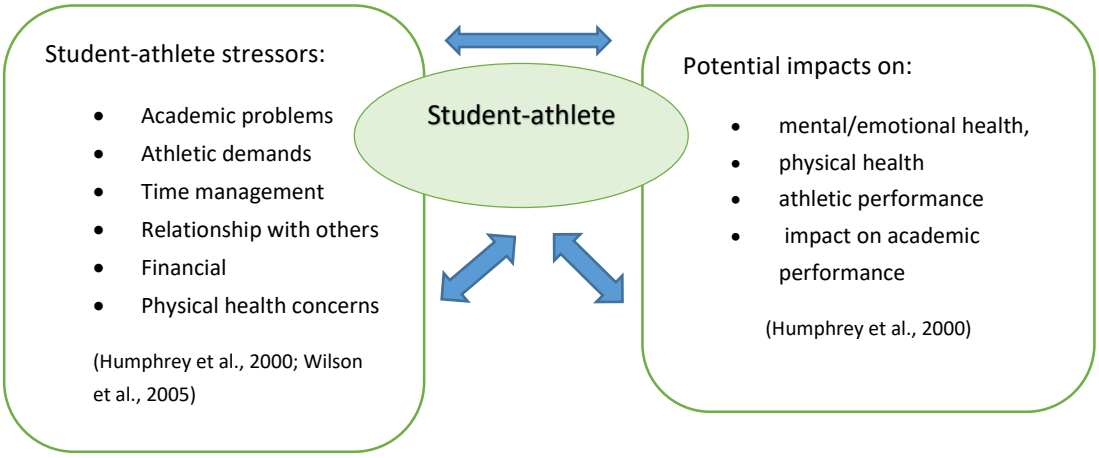


Figure 2.2 The duality of a student-athlete, various levels of stress and the potential impacts. (Humphrey et al., 2000; Wilson et al., 2005)

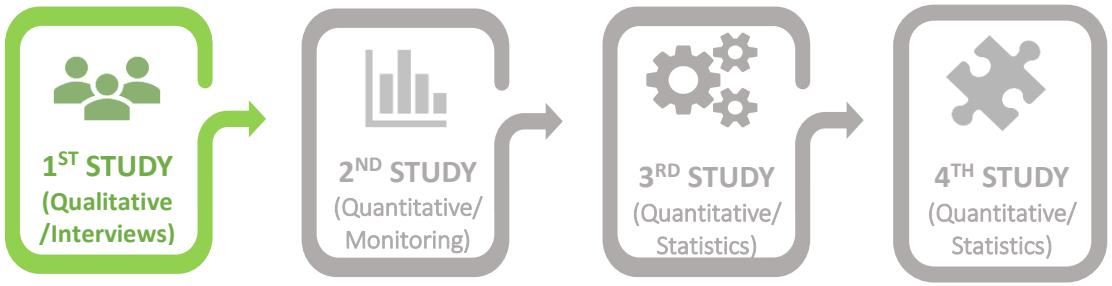
As a combination of these stressors can impact the student-athlete in multiple ways, it is important to be able to identify the relevant stressors affecting the individual in order to develop, implement support programs and appropriate interventions (McKenna et al., 2004; Wilson et al., 2005).

The student-athlete is always looking at optimising training and academic workload while maintaining a healthy social lifestyle (Adler et al., 1985; Carodine et al., 2001; Miller et al., 2002; McKenna et al., 2004). Faced with those challenges, the student-athlete is often subjected to an undulated level of stress through the course of an academic year. In line with the existing academic research from Wilson et al. (2005), Ferrante et al. (1996), Humphrey et al. (2000) and (Papanikolaou et al., 2003), student-athletes are subjected at key times (such as assignments week and designated study time prior to exams) to a high level of stress and might be subjected to various levels of stress, which can contribute to a disturbance in the stress recovery equilibrium. Without proper planning or monitoring, any imbalances or disturbances can jeopardise student-athletes academic and sporting career (Papanikolaou et al., 2003; Wilson et al., 2005). Due to the specific nature of being a student-athlete, there is a constant shift between being a student and an athlete (Pato et al., 2014; Stambulova et al., 2015) which can lead to a variety of stressors, both from an academic and sporting perspective (Adler et al., 1985; Wilson et al., 2005; Gomez et al., 2018). If unaddressed these stressors can lead to a disturbance of the psychophysical equilibrium, which can trigger tiredness, psychological stress and fatigue (Kellmann et al., 2001). Englobing the biological and psychological system, the psychophysical balance is often affected by the various life daily demands being either too high or too low. However, while it is apparent that stressors experienced by student-athletes are parts of a transactional, multidimensional and dynamic process, sports participation can also become a source of positive stress (eustress) (Kimball et al., 2003).

Athletic training loads are a predominant part of this psychophysical equilibrium: if the training load is not significant enough, the desired training effect will not be reached. In contrast, if the training load become excessive, an opposite effect can be reached and put the athlete at risk of overreaching/overtraining (Kenttä et al., 1998; Meeusen et al., 2012). Much research has been trying to pinpoint and highlight possible physiological, biological, psychological and immunological markers of inadequate stress recovery (Fry et al., 1991; Kenttä et al., 1998) with relative success. But despite a general consensus on overtraining (Meeusen et al., 2012) and various attempts to come up with reliable early warning markers to signal the onset of overtraining, there are limited results in these domains. Kellmann et al. (2001) via the exploration of the overtraining and recovery paradigm, highlighted the multi-dimensional aspect of stress and the importance to properly identify the factors affecting the athlete adaptation to training load but more importantly, the periodization of the recovery process. The same process has been investigated as well by Kenttä et al. (1998) by analysing, conceptualising the overtraining cycle and identify the structural aspects of the recovery process.

CHAPTER 3

Study One: The Challenges of a High-Performance Student-Athlete



Research Question

What are the experiences of the student athlete in balancing athletic demands, academics demands and social environment in an Irish higher education system?

Research Question

What are the stressors affecting the student athlete over the course of an academic semester?

Research Question

Is it possible to offer a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete?

Research Question

Validation of a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete

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Abstract

To become a top athlete requires time, commitment and meticulously designed training. Optimum adaptation to training requires the careful balancing of stress and recovery. The student-athlete has to balance all these demands with the additional requirements of an academic programme. This can bring unique stresses and challenges. This research aims to investigate the challenges of combining high-level sport with academic demands. Nine elite student-athletes (three females, six males) took part in semi-structured interviews around how the student-athletes balanced their training and sporting demands with the academic demands of their course of study. The interviews were transcribed verbatim and analysed using grounded theory. The results suggested that the athletes had each developed their own distinct approach towards training management. Most of the subjects had experienced a setback in their study and athletic performance due to overtraining or burnout. The findings highlight the need to empower and educate not only the athlete but also the coach on the impact of overtraining. Key findings from this study were the need for an open coach–athlete communication, in-depth planning and the need for adequate recovery.

3.1 Introduction

The demands of high level sport require the athlete to devote an increasing amount of time to their sport in order to compete effectively (Conzelmann et al., 2003). The term 'student-athlete' can have various meanings. The American literature defines it via the United States Code as "an individual who engages in, is eligible to engage in, or may be eligible in the future to engage in, any intercollegiate sport. An individual who is permanently ineligible to participate in a particular intercollegiate sport is not a student-athlete for purposes of that sport" (United States Code, 2004, p. 104).

However, Aquilina (2009, p. 27) with a more generic definition, considers student-athletes as "a group of individuals who are still in education but also train at a high level in sport" while Pato et al. (2014, p. 21) defines a student-athlete as "a person who is a full-time university or high school student, and who participates in athletics or play sport as an individual or member of a federation, a club, or a sport association". The type of student used for this research were those who were in a higher education institution, competing at a national to international level and were receiving support (financial and/or practical assistance) from the higher education institution.

3.1.1 The Complex Nature of the Student-Athlete

The student-athlete has the additional demands of an academic course to balance with their sporting activities. Compared to their non-student counterparts, student-athletes meet additional challenges on a daily basis (Parham, 1993). First year college comes with the further challenge of a completely different new environment. The transition from second to third level education has consistently been recognised as potentially difficult (Upcraft et al., 1989). The student has to establish a new routine to avoid unnecessary stress but the student-athlete has to seek a harmonious union between academics and sporting demands. In a study on Division 1 freshman athletes, Wilson et al. (2005) identified six major types of stress (relationship, academic, financial, physical and mental, body satisfaction and social stress) to which the new third level student-athlete is subjected.

Balancing priorities is key as the high-performance student-athlete aims to reach a high level academically while continuing to perform in their sport. While it is not uncommon for the elite student-athlete to devote 20 or more hours a week to practice, games, recovery and weightlifting sessions (Simons et al., 1999), the amount of hours dedicated to academic study varies hugely between subjects. The final years of study can also have widely different academic demands (Aquilina, 2009) and when combined with the professional requirements of some subjects, can present a significantly greater workload in the final years of study.

3.1.1.1 Academic Research and the Student-athlete

The American system and its school based approach, has a long-standing tradition in the management and development of the student-athlete. The unique institutional policies in place shape a unique system and enable the student-athlete to develop a successful dual career (Ryba et al., 2015). This environment garnered attention from scholars and generated quite a substantial body of research on a wide range of topics focusing on the student-athlete experience (Adler et al., 1985; Jordan et al., 1990; Sedlacek et al., 1992; Parham, 1993; Humphrey et al., 2000; Carodine et al., 2001; Shulman et al., 2001; Aries et al., 2004; Mazerolle et al., 2011). In comparison, the European system has a more divided approach as highlighted by Aquilina (2009). The findings of her European study painted a fragmented approach regarding the type of support provided by the national systems (Table 2.1). In light of various studies investigating the 'student-athlete' topic, (Amara et al., 2004; Aquilina, 2009; Aquilina et al., 2010), the European Union published in 2012 the "EU Guidelines on Dual Careers of Athletes" (European Commission, 2012) acknowledging the challenge to combine study and athletic career. This document aimed at the policymakers in the Member States suggested a framework of actions to introduce specific dual career guidelines and raise a greater awareness of the dual career concept. One of the key points of this document is the creation of a dialogue between educational institutions and sporting bodies to implement flexible academic structure and post-athletic support.

Type	Key features	Examples
1. State Centric Regulation	Responsibility is placed on HE institutions to provide adapted opportunities for student-athletes through legislation, statutory requirement or government regulation	France, Hungary, Luxembourg, Spain, Poland, Portugal
2. State as Sponsor / Facilitator	An approach where by the state promotes formal agreements to ensure that student-athletes' needs are being met at University level, for example through 'permissive legislation'	Belgium (Flanders), Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Sweden
3. National Sporting Federations / Institutes as Intermediary	There is an established system of recognised channels for sporting advocates (usually NGBs or national institutes of sport) to act on behalf of the student to negotiate flexible educational provision with HE institutions	Greece, United Kingdom
4. Laissez Faire: no formal structures	There are no structured measures in place and arrangements rely on individually negotiated agreements where these prove possible	Austria, Cyprus, Czech Republic, The Netherlands Ireland, Italy, Malta, Slovakia, Slovenia

Table 3.1 Typology of Approaches to Educational Services for Elite Athletes in Higher Education, taken from Aquilina (2009)

Although there is a growing body of research looking at the European student-athletes from a micro (i.e., individual), meso (i.e., interpersonal), macro (i.e., social) and global (i.e., policy) aspect, an extremely limited amount of research looked at the student-athlete in Ireland (Park et al.; Guidotti et al., 2015). Due to the limited academic research on the Irish student athlete, it is difficult to fully comprehend the effectiveness of the "EU Guidelines on Dual Careers of Athletes" (European Commission, 2012). The governing body of third level sport in Ireland (Student Sport Ireland (SSI)) has a mission to promote, develop sport and physical activity in the third level institutions across Ireland. The SSI 2017-2020 strategic plan focused

on four pillars: physical activity, sports clubs, high performance and organisation (SSI, 2017). The third pillar (high performance) is looking at developing and promoting an environment where the student-athlete can successfully balance their sporting and academic careers.

The growing demand on athletic performance results in an increase of training volume and practice time (Conzelmann et al., 2003) , which in turn puts substantial pressure on the student-athlete and increases the risk of the termination of the athletic career due to the priority shifting to the academics (Amara et al., 2004).

3.1.2 The Setting

In order to gain a better understanding of the student-athlete experience, it is important to provide some context of High-Performance sports within the Higher Education system in Ireland. Commissioned by Student Sport Ireland (SSI) and undertaken in 2014-2015, the Student Activity and Sport Study Ireland report investigated the sport and physical activity participation, preferences and provision in third level institutions across Ireland (Murphy et al., 2015). This report was able to identify some key points in relation to high performance:

- 6 % of students are taking part in sport at a high level.
- 83 % of all Universities offer scholarships/bursaries to high-performance athletes (60% of those scholarships beneficiary are males). However, only 1 in 10 elite student-athletes are recipients of a scholarship. Most of the

student-athletes participating in this study stated that the scholarship was insufficient to cover the athletic expenses

- Scholarships are divided over 30 different sports with a high disparity between male and female.
- Over one-third of Universities are able to offer access to academic courses via reduced academic requirements.
- Two-thirds of colleges fund their own scholarships with some financial support coming from Corporate sponsors and National Governing Bodies (NGB)
- Olympic and World University games do not represent a priority for most colleges.

The main recommendations resulting from this review were two-fold:

- SSI and NGBs should reflect and review the high-performance pathways currently existing within the Higher Education Institutions
- A review of the scholarships programmes should be carried out in the context of gender equality

All the participants of this present study were scholarship recipients (the financial amount ranged between 500 and 1500 euros) and had received extensive support from their respective NGBs (sports science, physiotherapy, financial support, etc..).

This present paper investigates the challenges faced by high-performance student-athletes at a third level institution in the Republic of Ireland. Through a series of semi-structured interviews conducted with high-performance student-athletes, this study examined the demands and pressure faced by this population. More specifically, the aim was to investigate:

1. How student-athletes approach and combine athletic and academic demands?
2. What are the student-athletes' attitudes and behaviours when facing burnout and fatigue?
3. What is the level of social interactions of those student-athletes?

3.2 Methods

3.2.1 Participants

The participants for this study (table 2.2) were part of a large Irish University with an enrolment of approximately 20 000 students. The university is located within a large Irish town and offers a wide range of undergraduate and graduate programmes to Irish and international students. The age of the nine student-athletes participating in this study ranged from 21 to 31 years at the time of the research (two students enrolled as mature students). As this study is predominantly trying to provide a window into the life of a student-athlete in an Irish University, it was important to select a panel displaying a variety of students from a wide-ranging sporting and academic perspective. This is an interview based, descriptive case

study to investigate the experiences of a group of high-performance student-athletes.

3.2.2 Rationale for Selection

As it is the case with life story research, the role and behaviour of the participants change over the course of time (Erikson, 1959; Adler et al., 1985; Howard-Hamilton et al., 2001); therefore, it is preferable to schedule interviews over different periods of time in order to get a longitudinal and richer view of the participants' experiences. Unfortunately, this study time constraint did not allow for such a thing, so it was important to select student-athletes at various points in their careers to get a greater insight into the decisions made at the various points of their academic and sporting career.

The participants were all currently competing or had formerly competed at a national or international level in their sport while studying at this third Irish level institution. Seven of the subjects were still studying at the university at the time of the interview and two had finished their degrees but were still actively competing in their sport. The study was advertised at the university High-Performance athlete gym, as it is one of the main places on campus that attract a wide variety of student-athletes. After gathering the names of athletes volunteering and expressing interest, the principal investigator contacted the athletes via email to organise a one-on-one meeting. This meeting was not only an opportunity to identify participants willing to share openly their student-athletes' experience but an

occasion to select participants who would show interest in the study, as it would allow for a greater richness of the data (Creswell et al., 2017).

Name	Age	Male/female	Sport	Faculty	Sporting achievement
Athlete 1	24	Female	Track and field	Medicine and Health	National
Athlete 2	22	Female	Track and field	Business and Law	International
Athlete 3	21	Male	Track and field	Science, Engineering and Food Science	International
Athlete 4	21	Male	Track and field	Medicine and Health	National
Athlete 5	31	Male	Hockey	Arts, Celtic Studies and Social Sciences (Post Graduate Diploma)	International
Athlete 6	25	Male	Rugby	Business and Law (MSc)	National
Athlete 7	25	Male	Rugby	Science, Engineering and Food Science	International
Athlete 8	24	Male	Rugby	Science, Engineering and Food Science	International
Athlete 9	27	Female	Basket Ball	Arts, Celtic Studies and Social Sciences	International

Table 3.2 Demographic profile of the nine athletes who participated in this study

3.2.3 Data Collection

An initial pilot study was used to test and refine the interview questions which impacts on the richness of the data collected (Satu et al., 2014). As mentioned by Corbin et al. (2014), questions are linked to the research and will inevitably change over the course of the analysis. The questions might remain the same but will evolve as the research progresses to facilitate the exploration of specific concepts. As it was not practical to transcribe verbatim (as every interviews were scheduled closely to each others), each interview prior to starting a new one, the principal investigator listened to the audio recording at the end of every interview in order to note and refine the questionnaire in line with the emergence of the new concepts (Holt et al., 2010). Each individual selected to participate in the study provided informed consent, and in accordance with ethical approval from the local Institution Ethics committee (Appendix C), total anonymity was guaranteed to the participants. The interviews took place in a neutral setting for convenience and privacy. Each interview used a similar narrative approach as Glesne (2015) and Sparkes (1998) by beginning the interview with a "grand tour" question (such as "can you describe to me your experience so far as a student-athlete"), inviting the participants to develop a focused monologue and allowing them to self-explore the subject offered. The principal investigator then used probes to clarify and explore various subjects (Flick, 2009). Clarification probes (Table 3.3) were used to refine some of the participant comments while the exploration probes focused on keeping the participant talking and/or providing greater depth (Gorden, 1975; Wilson et al., 1991; Rubin et al., 2005). Following the recommendations made by Creswell et al.

(2017) that interviewees from similar backgrounds are likely to interact and cooperate with each other, a focus group was set up with three rugby players who were playing in the same team. The interviews lasted between 20 and 45 minutes, recorded with the participants' permission, and then transcribed verbatim. As mentioned by Potter et al. (2005, p. 16), " although qualitative interviews are treated as relatively easy to perform, they are very hard to do well.", Barriball et al. (1994, p. 330) clarified that the semi-structured interview is well suited to the "exploration and clarification of complex issues" with an adequate "probing for more information and clarification of answers". While the aim of the semi-structured interview is to "standardise the stimulus" (Smith, 1992; Bryman, 2015), it is important to acknowledge that there is an assumption that every word corresponds to the same meaning and the participants share the same vocabulary. The semi-structured interview gave the opportunity to change words, but not the meanings of the questions and, therefore, indicated that the validity and reliability rely not on the same vocabulary but on the equivalence of the meaning (Denzin, 1973; Treece et al., 1977; Nay-Brock, 1983; cited in Barriball et al., 1994). In accordance with that statement, the initial pilot study allowed for a refinement and streamlining of the interview questions in line with the research questions.

Example questions from the semi-standardised interview
○ Can you tell me what is your sport and what are you studying? ○ How did you manage your training and academics for the first year? ○ Were you ever in a position when you had to choose between training and study? ○ Did you come across sessions that were too hard for you and did you talk about it with the coach? ○ If the study was getting out of hand would you try to communicate with the lecturer? ○ How did you cope with the increasing academic workload? ○ Does your coach make timetables for you regarding gym time, practice time…? ○ You are not only expected to get a degree or even a master but you are expected as well to win games and to keep the club at a high level. Don't you think it could be a bit pressurising? ○ If you are under pressure with the study did you speak about it to your friends or family? ○ How hard is it to balance study and training? ○ How do you manage socialising, studying and practice? ○ Do you plan your week regarding study and practice? ○ Do you notice any changes between your first year and this year in terms of planning? ○ Do you go out much and how is your social life?

Table 3.3 Interview sample questions (refined questions derived from the pilot interview)

3.2.4 Data Analysis

The interview data were collected and analysed (figure 3.1) using an approach similar to the one outlined by Cote et al. (1995). This analysis allows for the development and creation of an "organised system of categories that emerged from the unstructured data"(Cote et al., 1995, p. 72). Composed of multiple steps, the first stage consists of careful listening to the interviews recording and reading of the transcripts to allow for an initial sense of the emerging data (the stage is highlighted by Flick (2009) as the initial phase). Following this first stage, a series of meaning units (defined as meaningful pieces of information (Tesch, 2013) or as "the constellation of words or statements that relate to the same central meaning"

(Graneheim et al., 2004, p. 106) were identified, extracted from the main text and assigned to a descriptive tag. As an example, the following meaning unit (from a student-athlete) was tagged under the label 'control and organisation':

> *I usually plan every six months let's say September to February and February to June, July. For example, I know coming up to Christmas my exams so I have my easy week around that time* (Athlete 2, Interview, 2013).

The list of tags was then grouped together based on their similarities and redistributed into properties (Cote et al., 1995). These properties became part of wider categories allowing for the emergence and conceptualisation of the data via an identification of a link between the categories and their properties. The emergence of a conceptual model describing the various challenges faced by the Irish student-athlete was reliant on the broad approach to those student life stories and the integration of the categories highlighting the various components of that journey.

Any information and names that could potentially lead to identifying the identity of the participants have been removed.

3.2.4.1 Data Analysis: insider status and potential weaknesses, a retrospective viewpoint

Due to the researcher's insider status, it was important to be fully cognisant of the potential bias that could influence the quality of the data collected. While there are many arguments regarding the insider researcher status (as it allows for a certain amount of legitimacy (Adler et al., 1987; Kanuha, 2000) and acceptance from the group (Dwyer et al., 2009)), it can result in a lack of clarity (due to a lack of perception) when analysing/interpreting the data or conducting interviews. The following points highlight potential means to improve the quality of the data collected in this study:

- The involvement of an outsider to undertake the narrative analysis would have strengthened the data and removed any potential bias.

- The analysis of the data used a similar approach as the one used by Cote et al. (1995). Based on a grounded theory approach, this methodology presented various challenges, as this approach required a methodological in-depth knowledge. As highlighted by Roberts et al. (2006) and Leung (2015), validity in qualitative research is a subtle concept and research bias can undeniably have an impact on it. Owing to the researcher's limited experience in this type of grounded theory methodology, it is necessary to increase the credibility of the methods used and the dependability of the data. A potential approach would have been to implement (as outlined by Creswell et al. (2000) and (Flick, 2009)) various strategies and quality criteria in order to strengthen the validity of this research (i.e. second readers, auditing trail, process evaluation).

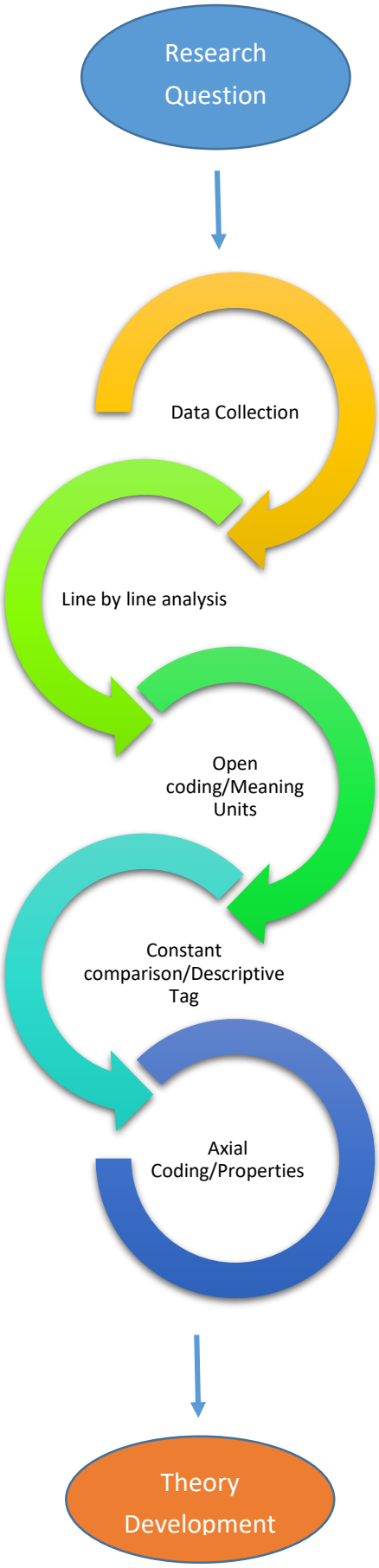


Figure 3.1 Data analysis process

3.3 Results and Discussion

The results below are the interpretation of the data collected from the nine student-athletes. The main descriptive tags are indicated in each of the three spheres (Figure 3.2) and contain various parts (or labels) ultimately influencing the student-athlete behaviours and reinforcing the multi-dimensional aspect of the student-athlete persona.

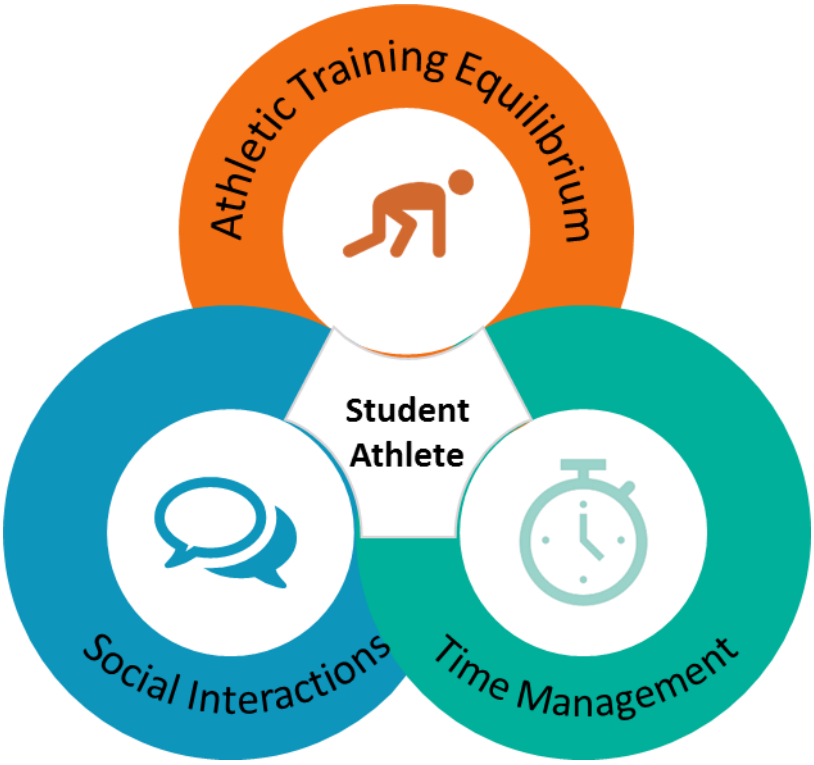


Figure 3.2 The student-athlete spheres of influence

3.3.1 Time Management: a Crucial Key to Control Stress and Optimise Training

3.3.1.1 Organisation

Time constraints and the need to learn to balance priorities between academics and sport was a consistent finding in this study. Loudon et al. (2013) found out that nearly half of student-athletes did not think that they had enough time to fully focus on athletics and academics. Athlete 3 described this struggle to balance everything due to a lack of time and decided to switch courses at the end of his first year:

> *Last year with architecture, we [had] a lot of practical work to do. To be honest it was a bit of a nightmare to do everything. A lot of back and forth and time-consuming. That was tough. This year has been easier. I have less hours and I am managing to do my study before training on the track.*
> (Athlete 3, Interview, 2013)

This highlights one of the most commonly identified sources of stress among first-year student: time management (Humphrey et al., 2000; Papanikolaou et al., 2003; Wilson et al., 2005). Inadequate management in this domain can lead to a feeling of inadequacy and impact negatively on athletic performance and academic results as demonstrated by Papanikolaou et al (2003). The first year is recognised as the most challenging for students and often higher education institutions devote

considerable time to support programmes for first-year undergraduates to help with the transfer from second level to tertiary education.

Athletes who are able to successfully combine training and study are able to display some very strong organisation skills. One interviewee was sharing his daily routine and highlighted the need to adhere to some kind of pattern in his planning.

> *My class usually finish at 2 so I can study between two o'clock and practice which is usually at six. I am coming at nine every morning regardless of whether I start and I would study until I have a lecture or training. For example, if my first lecture is at 11, I would still come at 9 am. Since I've been going to school, this kind of routine I've been drilled into me. Basically, get the work done.* (Athlete 4, Interview, 2013)

Although time management and the creation of a routine seem to be key components of a successful academic and sporting life balance in this study, it is worthwhile to know that it is part of a terminology known as "study skills" which is commonly described as activities necessary to organise and complete academic tasks and to prepare for and take tests (Robbins et al., 2004). The demands of training and subsequently continued training load increase over the past few years keep adding extra pressure on the student-athletes (de Subijana et al., 2015). One of the priorities identified in the recent literature would be education: empowering student-athletes via the use of sport psychology and other support to teach them

to optimise their time management skills (McKenna et al., 2004; de Subijana et al., 2015; Li et al., 2017).

3.3.1.2. Support

A new learning model, as explained by Pato et al. (2014), focusing on the tutoring and mentoring would considerably enhance the development of the student-athlete. Without a supportive framework, the student-athlete is constantly struggling with the duality of being a student-athlete (McKenna et al., 2004).

> *Everyone in the course is under pressure but the rugby kind of exacerbates this pressure but this is the commitment that you made in September when you agreed to play rugby. When you get really bad you have to make some priorities and usually studies always win.* (Athlete 8, Interview, 2013)

This statement is a recurrent point through the data of this study. As we can see in this declaration, the student-athlete's frustration to have to prioritise one or another reinforces one of the findings from McKenna et al. (2004). Via their research findings, McKenna et al. (2004, p. 189) highlighted three main areas of concerns " establishing priorities -student role versus athlete role-, relationship with academia and lack of support and understanding". Those themes arise from a lack of support (resulting in coping instead of a proactive management) and more importantly from an "underdeveloped awareness" (McKenna et al., 2004, p. 189). It is becoming even more crucial to "take care of the self of the student-athlete"(Pato et al., 2014, p. 28) and develop a supportive framework around the student-athlete

(Chartrand et al., 1987; McKenna et al., 2004; Aquilina, 2009; de Subijana et al., 2015).

Sport in the Irish education system has evolved to provide some support and opportunities to student-athletes but due to a lack of structured arrangements between sporting governing bodies and academic institutions, this can often result in varied levels of support, sometimes on an ad hoc arrangement (Aquilina, 2009; Murphy et al., 2015). An adequate athlete support programme suggests the inclusion of academic support, personal development and career counselling for the student-athletes (Carodine et al., 2001). The governing body for the third-level sport in Ireland (Colleges and Universities Sports Association of Ireland now renamed Ireland Student Sport) has put together a strategic plan to promote and develop third-level sport in Ireland and clearly highlights the goals needed to define clear developmental guidelines for elite athletes (College and Universities Sports Association of Ireland, 2012).

Some organisations like the *National Collegiate Athletic Association* in the United States of America (NCAA) recognised the need to provide a supportive environment to allow the student-athletes to succeed on and off the pitch (Abell, 2000) and has been introducing various holistic models of support programmes which include various services aimed to help and assist student-athletes. Key services such as academic, personal and career counselling are ultimately aimed towards helping the athlete to minimise stress, learn how to balance sport and academics and maximise their athletic potential (Etzel et al., 1996; Carodine et al., 2001). One

female subject in the current study had spent 4 years studying at an American university and experienced first-hand those services.

> *In first year, I met with my academic supervisor and we planned the four years: what classes I was going to take every semester and every summer. It was really good. By the end of my senior year, I only had 2 classes left so I could really focus on my sport*. (Athlete 9, Interview, 2013).

In-depth planning combined with her academic pathway, allowed the athlete in this case, to fully dedicate herself to her sport and ultimately bring success in her sport and academically. The planning and time management remains a critical issue highlighted by the student-athlete but it is often depending on what support structure the student-athlete has access to that will dictate its effectiveness (Pato et al. 2014; Aquilina 2013).

The first year is often described as a *rite de passage* (Upcraft et al., 1989) and a dedicated, in-depth student-athlete support structure will help to empower and equip the student-athlete as they adapt to the new environment. The SSI report (Murphy et al., 2015) recognises the need to introduce support programmes for high-performance student-athletes and recommended to review the development pathway for elite male and female students. Higher Education Institutions across Ireland are developing specific support programmes aimed at supporting elite student-athletes and enhancing the experience of these individuals (such as the Quercus and Astra programs offered by the University College Cork and University

College Dublin.) These programmes offer a wide range of benefits from campus accommodation, individualised career advice and life coaching to flexible academic arrangements. These services are still in their infancy, and time will see how effective these services have been to help the talented student-athletes to achieve a greater balance and time management.

Via the course of the interviews, student-athletes are appreciative of the support they are getting from their respective network support. Composed of multiple layers, the support network involves a wide array of persons aimed at supporting the student-athletes via the various stage of their career (Figure 3.3) (Aquilina, 2013).

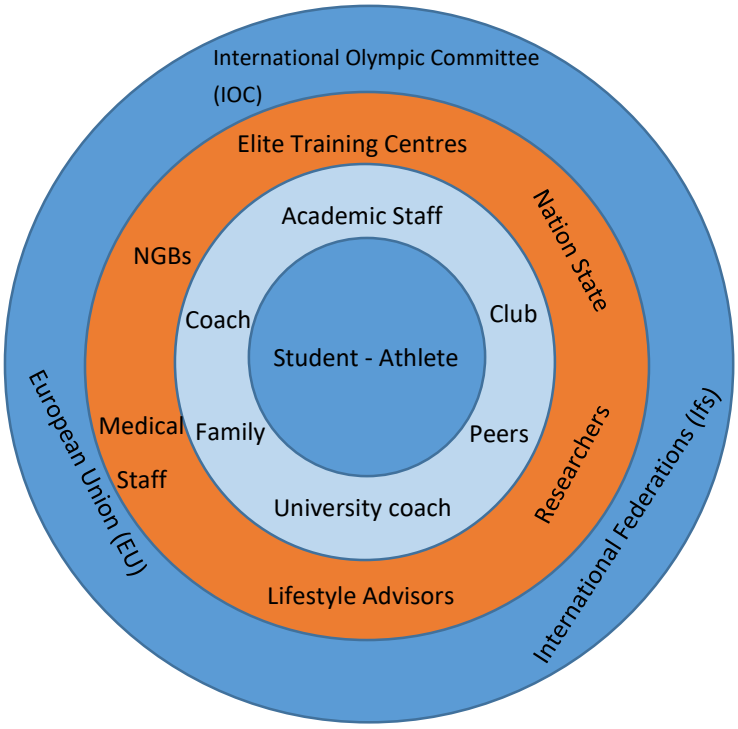


Figure 3.3 Supporting networks for student-athletes, national and international level, taken from Aquilina (2013)

The coach can be a key player in helping the student-athlete balance their workload. Multiple athletes highlighted in the interviews the help and assistance of their coach in providing important support in the student-athlete academic development:

> *Rugby was more or less steady the whole way through; the college was really busy around March. It is all very manageable here because the coaching staff are very accommodating.* (Athlete 2, Interview, 2013)

Another student-athlete provided a similar statement, and highlighted the coach support:

> *There was an increase, especially when I did the higher diploma in education. I think it was 2007/2008. There was a serious increase in workload as I was both on placement and in college. I was on placement in the morning and college the afternoon. I had a lot more to do and a lot more deadlines. I managed it but between the hockey and the study, it was tough. It was a case of trying to balance as much as possible. I was in a situation where I was in a school that was very helpful with regard to the hockey. The new coach was keen to keep me in the squad and was willing to speak to college on my behalf, regard to trip, games etc… but I tried to keep as much as possible a balance.* (Athlete 5, Interview, 2013)

Another student-athlete organised her training loads in relation to the academic workload, while at the same time, involving her coach in the process:

> *You have to know when you are getting busy and adapt your training. During my busiest week of exams, I tend to cut training load and when college is easier, let's say the winter, I would do my heaviest phase. I would train hard and when I would come to May and exams time, I would lighten up my load and train maybe twice a week. I would tell my coach my exams time so he could lighten up the practice.* (Athlete 2, Interview, 2013)

More than once during the academic year the student has to make a choice between training and study and for most of the athletes, their focus remains strongly on academic success sometimes to the detriment of athletic performance:

> *Everyone in the course is under pressure and the rugby kind of exacerbates this pressure but this is the commitment that you made in September when you agreed to play rugby. When it gets really bad, you have to make some priorities and usually studies always win.* (Athlete 8, Interview, 2013)

It is becoming clear that each student-athletes has various ways of prioritising their tasks and balancing the workload. The above statements reinforce the need to teach student-athletes to learn how to manage their time and help them to develop a balanced relationship with the external demands (Aquilina, 2013; de Subijana et al., 2015).

3.3.2 The Impact of Overtraining on the Student-athlete

Students and student-athletes are subjected to a variety of stressors (Kenttä et al., 1998; Ross et al., 1999; Stilger et al., 2001; Zajacova et al., 2005). A survey from Adlaf et al. (2005) conducted in 2004 among 6282 full-time Canadian undergraduates found out that one third (29.2%) of students reported elevated distress (constantly under stress, loss of sleep over worry, feeling unhappy or distress). Those findings are similar to a Canadian campus survey performed among 7800 Canadian undergraduate students with 30% of those students reporting elevated psychological distress (Adlaf et al., 2001). The genesis of the stress can have multiple origins as pointed by Robotham (2008): it could be related to studying, undertaking exams, transition to university, financial issues or being in a different country.

To successfully improve athletic performance, the student-athlete needs to match the recovery with the level of physical and psychological stressors to which they are being subjected (Figure 3.4) otherwise they are at risk of over/undertraining. Studies have suggested that student-athletes subjected to high level of stress are likely to develop unhealthy habits and psychological problems (Skirka, 2000) which can lead potentially to a non-functional overreaching state and if incorrectly addressed, overtraining level. Those two stages are quite similar but diverge mainly on the duration needed to restore the performances: the overtraining symptom (see table 4.1, page 82) has been defined as a long term decrease in performance capacity due to an accumulation of training and/or non training-stress in which the

restoration of performance capacity may take several weeks or months (Meeusen et al., 2012). The earlier stage (the non-functional overreaching state) results in short term decrement in performance capacity and the restoration of performance can occur within several days to weeks (Meeusen et al., 2012). Participants in the current study had some very specific experiences in relation to overtraining, not only in relation to their perception of it but in the manner they decided to deal with it.

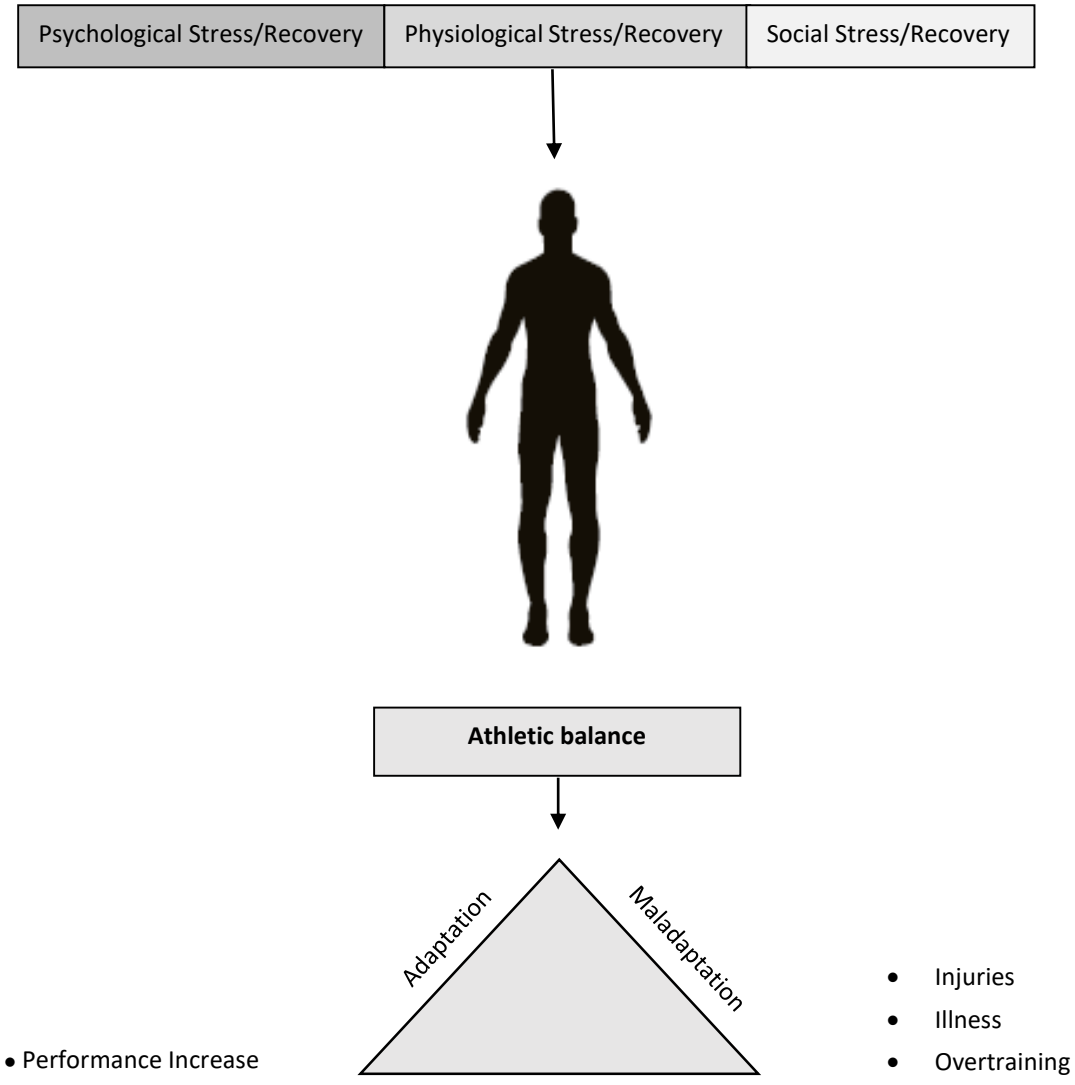


Figure 3.4 Stress Recovery balance. (adapted from Kenttä et al., 1998; Brink et al., 2010)

In the current study, out of nine athletes interviewed, two athletes suffered an injury due to overtraining and one athlete had to take 3 months off in order to recover fully from the symptoms. These three cases of overtraining were triggered by an inappropriate recovery time and miscommunication between coach and athlete. One of the more severe cases is athlete 1, who is an illustration of an athlete going from a functional overreaching state to overtraining. At first, she started to perform quite well in training:

> *Well, initially, I started to do really well, a month or two into training people would say: Oh, you have great potential. But of course, the more I heard that the more I decided to train harder and harder. Eventually, after about a year, I was still going very well but I was kind of waking up tired. My initial reaction was to train even harder, which is stupid, but I just ended being sick, not being able to get out of bed for about three months.* (Athlete 1, Interview, 2013)

As it is quite often the case, athlete and coaches appeared to be ill-informed about training, overtraining, recovery, and the pervasive impact of overtraining (Etzel, 2006 p.522). Kentta & Hassmen (1988) highlighted the need to have a specific recovery process and protocol in place to prevent the athlete reaching a non-functional overreaching state or even overtraining. Athlete 1 was told by her coach to take some time off:

> *The coach helped me. He told me to take it easy and to relax but I was getting frustrated because I could not understand what was happening.* (Athlete 1, Interview, 2013).

The coach-athlete relationship has one of the most important influences on the intrinsic and extrinsic athlete motivation (Vallerand et al., 2001; Mageau et al., 2003). Quite often, the coach plays a pivotal role in the athlete personal and sporting development. To successfully negotiate the athlete's psychological and physiological variation, the coach requires an effective ongoing support programme (Jowett et al., 2003; Vella et al., 2013; Davis et al., 2014). A study conducted by Vella et al. (2013) among 455 adolescent athletes revealed that in order to impact positively on the developmental outcomes of the athletes, a positive role modelling linked with individual consideration was required. Another study (Lorimer et al., 2009) highlighted that in order to reach an effective understanding (and therefore develop a positive and fruitful relationship between the coach and athlete), it is preferable to "develop an athletic partnership. This means not exclusively focusing on instruction and sport" (Lorimer et al., 2009, p.158). An effective support programme aimed at developing the coach proactive and reactive strategies (Davis et al., 2014) can positively impact on the coach-athlete relationship.

The student-athlete is subjected to various external and internal stressors and without an inadequate understanding of the level of recovery needed to restore an optimum balance, it could lead to a decrease in performance:

> *I got to a point I was telling people and I was being told to keep going. I knew myself if I kept going, something was going to break down. I was starting to struggle a lot and was getting quite grumpy. I was being criticized at times about the way I was playing; it was not because I was not a good player it was because I was exhausted*. (Athlete 5, Interview, 2013)

This student-athlete gave a deeper insight into the repercussion and consequences of this performance decrease:

> *I was not enjoying the training like I used to and I knew something was up and that's when I decided to ease back. I was starting to take criticism very personally instead of accepting it and moving on. I was getting annoyed because I was trying as hard as I could but nothing was coming. Mentally I was probably telling myself 'if you want to improve things, I have to work harder' but in hindsight it was probably the rest I needed*. (Athlete 5, Interview, 2013).

Mood disturbances were highlighted in a study performed on competitive swimmers with an increased training stimulus, and therefore put those swimmers in an overreaching and then an overtraining state (Morgan et al., 1987). A monitoring of mood states combined with measures of performance is a useful indicator and can prevent the athlete to reach an overreaching and overtraining state (Morgan et al., 1988; Kenttä et al., 1998; Terry et al., 2007).

Another athlete who took part in the interview process had a similar experience:

> *I was getting tired but I was pushing through it and I kept it to myself. But the more I was getting tired and the more I realized something had to be wrong. I could not be that tired all the time. I waited 4 to 5 days before deciding to go to my athletic trainer. He was brilliant. We were talking to him all the time. I would not have approached my head coach. She was very unapproachable. She had so much control over who was playing or not. I felt safer by talking to the athletic trainer. After the blood test came back, I had to rest for 6 weeks.* (Athlete 9, Interview, 2013)

This comment highlights a classical overtraining process: after the initial "slump", the athlete tries to compensate and increase the training load to increase the performance but then realises that they are not getting anywhere. In that situation, the athlete had an extremely poor communication and dysfunctional relationship with the coach. She had to flag this issue with the physical trainer (in which she had a greater trust). This once again shows the need to have an open communication between the athlete and the coach, and between all coaches involved with an athlete (Lorimer et al., 2009). A week comprises 168 hours and various stressors can affect the student-athlete, each in a different way through the day without the coach realising it. Coaches will have a unique impact on the athlete motivation (Mageau et al., 2003) and this study shows that in order to allow the student-

athlete to reach a positive athletic performance, the coach needs to develop a high level of empathy towards the athlete linked with a shared cognitive focus.

One commonality among the participants of this study who suffered from overtraining was a lack of knowledge: they were not aware that they were going into a non-functional overreaching or overtraining stage. Of course, a specific monitoring process is crucial to control the training load in order to adapt the intensity to the psychological and physiological state of the athlete. However, as shown via those interviews, the monitoring is only part of a specific support process. The implementation and easy access to dedicated student-athlete counsellors would alleviate the potential risk of psychological burnout and would help the student-athlete to cope with psychological distress (Chartrand et al., 1987; Etzel et al., 1996; Humphrey et al., 2000; Mazerolle et al., 2011) while a subjective and/or objective monitoring system used on a regular basis could prevent the student-athlete from entering an overtraining state (Hooper et al., 1995; Kenttä et al., 1998; Meeusen et al., 2013; Saw, 2017).

3.3.3 Social Interactions

The results of the current study showed that athletes display very different behaviours regarding social interactions and specifically their attitude towards socialising. Athletes develop social contact through interactions on campus, class and athletic clubs. Loneliness at a cultural level has been identified in the National

College Athletic Association student-athletes, with social interactions limited to teammates and other athletes (Adler et al., 1985; Miller et al., 2002; Miller et al., 2003). The current study, however, did not come across any of these findings. This is possibly due to the different organisational context and management of the elite student-athlete in Ireland. The athletes interviewed did not have difficulties socialising and interacting with non-athletes. However, during the interviews, one of the common themes mentioned by the student-athletes was their behaviours in relations to alcohol consumption.

3.3.3.1 Alcohol consumption and the student-athlete

Student-athletes have been identified at a higher risk of alcohol abuse and risk behaviours related to alcohol consumption than their non-sporting student peers (Wechsler et al., 1997; Leichliter et al., 1998; Green et al., 2001; Hildebrand et al., 2001; Brenner et al., 2007) but these studies looked at the American collegiate system and are not necessarily transferable to the Irish educational system. There is a distinct lack of specific research into the consumption and impact of alcohol on the Irish student-athlete population and further investigation might be needed to explore this subject. Most athletes interviewed understood in this study the impact of alcohol on performance and had varied ways of approaching it:

> *I like to have a drink but I would not drink before a race or a game. I cannot physically do it. After training so hard I hate to ruin it over one night. Having said that I would have a few drinks after a competition and I would take 1 or 2*

days off to recover. I fit the drinking around the competition as opposed to the other way around. (Athlete 1, Interview, 2013)

Another student-athlete would not hesitate to adopt a more similar approach:

"You know you are not going to train well if you are drinking. Generally, if I was training, I would not go out or if I did I would not drink a whole lot!" (Athlete 5, Interview, 2013)

One of the athletes interviewed would go as far as not drinking in the competition season:

"I am quite a social person and I like to go out but I try to balance it out and I would try to plan it. Let's say in the winter, I would go out once a week on my days off (Friday, Thursday night) and I would not drink every week, but once I hit April, beginning of May I would not drink for the summer. I always try not to miss things, let's say a friend's birthday, I would go, but I would not drink and I would try to get extra sleep in the morning." (Athlete 2, interview, 2013)

Most interestingly, attitude towards drinking slightly differs between individual sport and team sports as in this case, athletes taking part in a team sport the group had their behaviour towards socialising and drinking dictated by the team:

> *"The first two years we made a decision (the group) that we would go out and drink on Saturday to Tuesday and then you will stay off the drink for the rest of the week."* (Athlete 7, Focus Group, 2013).

The purpose of this study was not to look at the use of alcohol among student-athletes in Ireland, but the interviews suggested the elite student-athlete subjects would consume alcohol on a regular basis, especially for athletes competing in a team sport. Different sports have different attitudes and cultures when it comes to alcohol (Lyons, 1998). It is important however, to point out that the current study looked at athletes and not Irish student-athlete specifically. In order to educate players, various Irish sporting bodies such as the Gaelic Athletic Association (GAA) and the Irish Rugby Football Union (IRFU) are publishing guidelines on alcohol consumption and the effect of alcohol on performance (Gaelic Athletic Association, 2018; Irish Rugby Football Union, 2018).

3.4 Conclusion

This findings of this study via a series of interviews conducted with nine student-athletes gives a brief window into the life of an Irish student-athlete and their ways of managing their lives around three essential parts: the academics, athletic and social. The concept of balance was understood by all the participants in this study but remains subjective and would vary between student-athletes. The student-athlete focus would be shifting at various times of the year to fulfil various priorities, which reinforce the paradigm proposed by Pato et al. (2014 p.20) and the

"centaur" analogy. The complex profile of the student-athlete requires (as highlighted by the various student-athlete statements in this study) an in-depth network of people to support them as the effectiveness of the balanced lifestyle relies not only on the student-athlete but also on the support network (Miller. et al., 2002). Despite the introduction of multiple scholarships offers through the Higher Education system in Ireland, there is a need to develop a support-learning model to help them to make responsible decisions. Models such as the one proposed by the NCAA (National Collegiate Athletic, 2004), European Commission (2012), Pato et al. (2014) are providing guidelines and guidance in that area. The recent report published by SSI (Murphy et al., 2015) represents a positive step in that direction with the review of the existing support system.

This study also uncovered cases of overtraining due to varying reasons. One of the recurrent causes of this seemed to be an apparent lack of communication between the coach and the athlete. A holistic support model linked to an access to counselling could help educate the athlete and allow them to deal with the psychological challenges more effectively. An easy, regular and practical monitoring system integrated into the athlete training would allow for better control over the physiological demands.

This study also looked at the social interaction for student-athletes. The recognition of the potential adverse impact of excessive socialising appeared to be apparent.

Interestingly, different athletes in different sports had very different attitudes towards socialising. Differences were particularly pronounced in respect of team sports athletes versus individual sports athletes.

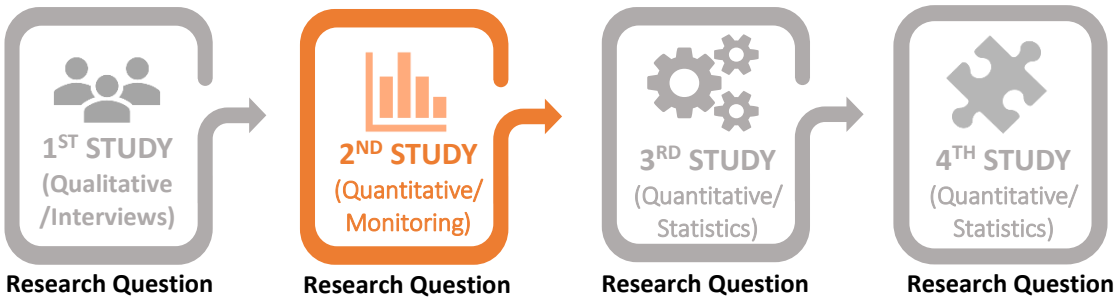
This study takes a step towards a deeper understanding of the struggles faced by the student-athlete within an Irish Higher Education system. It is important to note that the Irish educational system is constantly developing various ways to support the student-athlete and specific research looking at the Irish student-athlete would greatly benefit those developments. Sport Ireland recently announced a substantial investment of more than €20.7m (Sport Ireland, 2018) in order to develop and cement existing High-Performance NGB's projects. However, this funding is aimed at NGB's and not necessarily towards the Higher Education institutions; which leaves a distinct dichotomy between universities and NGB's and student-athletes relying on ad hoc provisions dispensed by these Higher Education institutions.

This study opened a window into the life of student-athletes in an Irish Higher Education and provided a greater insight into their varied and at times, cohesive approach toward their training, academics and social spheres. Over the course of their transition into the Higher Education system, the student-athlete will be faced with a variety of stressors and addressing those challenges is not always easy. Those unique stressors (Papanikolaou et al., 2003; Wilson et al., 2005) will affect student-athletes in various ways as the reaction to stress relies on the individual's ability to effectively cope with it (Selye, 1956; Lazarus et al., 1984). Most of the

body of research looking at the student-athlete and stress has taken place in North America, leaving the student-athlete in Europe and more specifically the Republic of Ireland a relatively understudied area. The next chapter of this thesis will aim to provide not only a greater awareness regarding the arrays of stressors impacting the student-athlete over the course of an academic semester, but as well to offer an insight into the frequency and qualities of the associated recovery activities undertaken by the student-athletes in an Irish Higher Education Institution.

CHAPTER 4

Study Two: Monitoring the Levels of Recovery in High-Performance Student-Athletes over a Semester in an Irish Third Level Institution



Research Question

What are the experiences of the student athlete in balancing athletic demands, academics demands and social environment in an Irish higher education system?

Research Question

What are the stressors affecting the student athlete over the course of an academic semester?

Research Question

Is it possible to offer a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete?

Research Question

Validation of a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete

4.1 Introduction

The first study looked into three spheres (academic, sport and social) affecting at various times the student-athlete. However, as many more stressors can impact a student-athlete, this chapter outline 'Study Two' which investigates student-athlete stress in much more depth and more specifically the stress recovery state among student-athlete in an Irish third level institution by using the Recovery Stress Questionnaire (RESTQ-Sport 52) designed by Kellmann et al. (2001). This questionnaire depicts the various stress states affecting the user along the recovery-associated activities.

4.1.1 The Stress Recovery Balance and Monitoring Implications

Any physical training generates an adaptive reaction from the body. This training effect can have various impacts on the body's homeostasis (which the body ability to regulates its internal environment) as the body is adapting to the different levels of stress to which it is being subjected (Gambetta, 2007; Bompa et al., 2015; Nagle et al., 2015). As a result, the desired outcome of this training effect can be called supercompensation and instigates a series of psychological and physiological response from the body (Hausswirth et al., 2013).

A study from Rietjens et al. (2005) observed the fluctuations of physiological, biochemical and psychological markers occurring in athletes over the course of 2

weeks by increasing their training factors. Seven well-trained cyclists doubled their training loads and increased the intensity by 15% in an attempt to investigate if fatigue leading to potential overtraining could be diagnosed via a variety of markers. As the training intensified, training load, strain and monotony (calculated using the Rate of Perceived Exertion scale) increased, which suggested an imbalance between training and recovery. Among the various markers in place, the 'Profile of Mood States' (POMS) questionnaire showed a decrease in the global mood score and more specifically, an increase in the anger scale, decrease in the vigour score and an elevated fatigue score. Associated with a decline in performance, a disturbed POMS profile can be the precursor to the overtraining syndrome (Morgan et al., 1987; Meeusen et al., 2012). Along these results, a decrease in the reaction time performance test was noted, which is an indication of the cognitive function of the brain (Adam et al., 1998; Nederhof et al., 2006) as it requires the complex task of information processing, decision making and reaction time.

Other markers in this study (such as the plasma hormones, haemoglobin, maximal blood lactate, white blood cell profile or maximal heart rate), showed very little or no change. In accordance with these observations, Rietjens et al. (2005) suggested that "central fatigue precedes peripheral fatigue" (Rietjens et al., 2005, p. 16). A similar conclusion has been highlighted by Saw (2017) via a systematic review of 54 studies: subjective measures (mood disturbance, perceived stress and recovery, symptoms of stress) demonstrated superior sensitivity and consistency compared

to objective measures. Subjective measures consistently identified acute changes in training load, more specifically the changes in the athlete wellbeing and therefore denoted a superiority over objective measures (Coutts et al., 2007; Saw, 2017).

The athlete wellbeing can fluctuate greatly (Table 4.1) over the course of a training program as training cycles will aim to develop a positive adaptation. As showed in table 4.1, a carefully planned training overload coupled with an appropriate recovery will lead to extreme fatigue but will trigger an increase in performance. However, any continuations of intensified training without appropriate recovery can lead to a substantial decrease in performance. The duration of recovery required to regain an optimum level of performance can range from days to month and maybe more.

Process	***Insufficient training***	***Training (overload)***	***Intensified Training*** →		
Outcome		Acute Fatigue	Functional Overreaching	Non-Functional Overreaching	Overtraining Syndrome
Recovery		Day(s)	Days-Weeks	Weeks-months	Month- ….
Performance	Under-performance	Increase	Temporary Performance Decrement	Stagnation, Decrease	Decrease

Table 4.1 Athlete wellbeing and the different stages of training (Meeusen et al., 2012).

However, a successful training program will be reliant on the appropriate use of an adequate training volume/intensity matched with the right level of recovery (Hausswirth et al., 2013). As highlighted by Meeusen et al. (2012), an inadequate level of recovery can trigger the athlete into an overtraining state and potentially impair the athlete's progression as the fatigue could last weeks to months.

Kellmann et al. (2001, p. 21) define the concept of stress as a " destabilization or deviation from the norm in a biological/psychological system" and suggests that athletes are impacted by a lack of recovery instead of excessive stress, therefore suffering from under recovery instead of overtraining (Kellmann, 2002). This model proposes an interweaving relation between the recovery and stress state which results in an optimum performance (as the stress and recovery levels must increase simultaneously to keep the biological/psychological system balanced). However, any imbalances (such as the level of stress exceeding the individual's stress capacity) will lead to a reduced performance. The principal component of this model revolves around the idea that in order to maintain a stable stress-state, one must be able to adopt various recovery protocols in line with the level of stress experienced. Otherwise, a negative stress state balance can occur and trigger a negative cycle, which can lead to overtraining symptoms. Kellmann (2010, p. 96) advances via this model that, with a moderate level of stress and an appropriate level of recovery, individuals can achieve an optimal level of performance. However, as an athlete advances along the stress-state, an increased recovery effort is required to optimise balance this state. Otherwise, a negative state will be

triggered. An efficient monitoring program becomes then an essential part of a training program in order to allow an optimum training balance (Kenttä et al., 1998; Rowbottom et al., 1998; Halson, 2014; Saw et al., 2015).

Among the various tools available to athletes and coaches to monitor the training stimulus, the athlete's self-report measures (ASRM) subjectively assess athlete physical, psychological and/or social wellbeing and look at various evaluating factors such as mood disturbance, perceived stress and recovery, physical and behavioural symptoms (Saw, 2017).

Part of those self-report measures, the Recovery-Stress Questionnaire for Athlete (RESTQ-Sport) is a monitoring tool measuring the frequency of stress and recovery activities (Kellmann et al., 2001). This questionnaire has been described (Kenttä et al., 1998, p. 12) as one of the few questionnaires encountered in the literature that attempts to address the full complexities of stress and recovery and its biopsychological perspective allows for a simultaneous assessment of stress and recovery.

4.1.2 The Recovery-Stress Questionnaire for Athlete (RESTQ-Sport): a Brief Overview

Originally designed by Kallus (1995), the Recovery Stress Questionnaire was developed to have a greater, in-depth view of the various stress levels from an individual perspective. The principal idea behind the initial construction of the questionnaire was to provide a granular view to the answer of "how are you?" via a more precise subjective view of events and a greater understanding of the frequency of behaviour (Kellmann et al., 2001). The original questionnaire contained 12 general recovery and stress subscales with no specific population in mind. It was later extended by seven sport specific scales to identify the full complexities of stress and recovery in athletes (Kellmann et al., 2001).

Composed of two different modules (the basic RESTQ and Sport Specific module), the stress and recovery aspect of the questionnaire relies on questions derived from stressor classifications by Janke (1976). The first version of the questionnaire contained 86 items but after years of research and development with various athletic samples, reached the final version with RESTQ-Sport 76 and the RESTQ-Sport 52. Kellmann et al. (2001) recommend the use of the RESTQ-Sport 52 in longitudinal studies while the RESTQ- Sport 76 is advised when only a few specific measurements can be examined.

This questionnaire is based on the paradigm that a stress level increase needs to be matched by an equal increase in recovery in order to avoid any changes to the person's psychophysical state. The RESTQ-Sport aims to evaluate the stress recovery balance during the past three days/nights, via a variety of general and sport-specific scales. Widely used by multiple sports, countries, adolescent and adult athlete populations (Kellmann et al., 2000; Jürimäe et al., 2004; Gonzalez-Boto et al., 2008; Nederhof et al., 2008), the RESTQ-Sport has proved its effectiveness in relation to individuals and teams monitoring over a micro cycle (such as training camp) or even a macro cycle (an entire season).

The questionnaire used in this study is the RESTQ-Sport 52: composed of 19 subscales measuring the frequency of stress (10 subscales) and recovery activities (9 subscales) (See table 3.2 and 3.3 for an outline of each subscale), it measures the stress recovery state over the past 3 days/nights. The use of this questionnaire is able to provide a reflection of the athlete response to the training load variation: a literature review performed by Saw (2017) highlighted various studies showing a relationship between stress and load, with an inverse recovery training load relationship (Jürimäe et al., 2004; Coutts et al., 2007; Gonzalez-Boto et al., 2008; Morales et al., 2014; Elbe et al., 2016).

The 19 subscales of the RESTQ-Sport 52 are divided between 2 modules: the general module is composed of seven stress and five recovery subscales (Table 4.2), while the sport specific module contains three stress and four recovery subscales (Table 4.3).

General Stress Subscales	General Recovery Subscales
1. General stress (Subjects with high values describe themselves as being frequently mentally stressed, depressed, unbalanced, and listless)	8. Success (Success, pleasure at work, and creativity during the past few days are assessed in this area)
2. Emotional stress (Subjects with high values experience frequent irritation, aggression, anxiety, and inhibition)	9. Social Recovery (High values are shown by athletes who have frequent pleasurable social contacts and change combined with relaxation and amusement)
3. Social stress (High values match subjects with frequent arguments, fights, irritation concerning others, general upset, and lack of humour)	10. Physical Recovery (Physical recovery, physical wellbeing, and fitness are characterized in this area)
4. Conflicts/Pressure (High values are reached if in the preceding few days conflicts were unsettled, unpleasant things had to be done, goals could not be reached, and certain thoughts could not be dismissed)	11. General Wellbeing (Besides frequent good moods and high wellbeing, general relaxation and contentment are also in this scale)
5. Fatigue (Time pressure in job, training, school, and life, being constantly disturbed during important work, overfatigue, and lack of sleep characterize this area of stress)	12. Sleep Quality (Enough recovering sleep, an absence of sleep disorders while falling asleep, and sleeping through the night characterize recovery sleep)
6. Lack of Energy (This scale matches ineffective work behaviour like inability to concentrate and lack of energy and decision making)	
7. Physical Complaints (Physical indisposition and physical complaints elated to the whole body are characterized by this scale)	

Table 4.2 RESTQ-52 Sport General subscales and a brief outlines of each subscales measurement, taken from Kellmann et al. (2001)

Sport Specific Stress Subscales	Sport Specific Recovery Subscales
13. Disturbed Breaks (This scale deals with recovery deficits, interrupted recovery and situational aspects that get in the way during periods of rest (e.g., teammates, coaches))	16. Fitness/Being in Shape (Athletes with high scores describe themselves as fit, physically efficient, and vital)
14. Burnout/Emotional Exhaustion (High scores are shown by athletes who feel burned out and want to quit their sport)	17. Burnout/Personal Accomplishment (High scores are reach by athletes who feel integrated in their team, communicate well with their teammates, and enjoy their sport)
15. Fitness/Injury (High scores signal an acute injury or vulnerability to injuries)	18. Self-Efficacy (This scale is characterized by how convinced the athlete is that he/she has trained well and is optimally prepared)
	19. Self–Regulation (The use of mental skills for athletes to prepare, push, motivate and set goals for themselves are assessed by this scale)

Table 4.3 RESTQ-52 Sport Specific subscales and a summary of each subscales measurement, taken from Kellmann et al. (2001)

This questionnaire has shown responsiveness to both acute and chronic training load (the most sensitive subscales being fatigue, physical recovery, general wellbeing and being in shape. The other subscales showed little to no sensitivity). However, despite some of the subscales unresponsiveness, the overall stress and recovery score showed reactivity to the overall training environment (Saw, 2017). The multiple constructs of the RESTQ-Sport questionnaire allow it to encapsulate the athlete subjective wellbeing responses to training and non-training stressors (Meeusen et al., 2012). The questionnaire rapidly gained popularity and has been used across a variety of sports, populations, nations (Kellmann et al., 2000; Mäestu

et al., 2006; Coutts et al., 2008; Nederhof et al., 2008; Filaire et al., 2009; Brink et al., 2010; Morales et al., 2014; Elbe et al., 2016) and showed efficacy to assess the stress recovery state of an athlete.

4.1.3 Aims of Study Two

The aim of this study is to monitor and investigate the recovery stress state of nine student-athletes over the course of an academic semester. As highlighted in the academic literature, the student-athlete population can be exposed to a variety of stressors and in accordance with this body of research, the expectation would be to notice a specific stress increase and recovery decrease (as these two states are interlinked) at some very specific time. A couple of key moments impacting on the student-athletes' life occurred during the course of this present study: the assignment week was on the 8th week, while the start of the study month leading to a 3 weeks exam period was on week 11. It would be therefore logical to witness a rise in the stress levels at week 8 and from week 11.

The aims of this chapter are twofold: 1) to identify and confirm, in line with the existing academic literature, the various stressors affecting the Irish student-athlete population over the course of an academic semester and 2) to verify, the questionnaire efficacy and validity among the Irish student-athlete population. The purpose of this present study is to be able to offer a reliable and practical

monitoring tool able to identify the Irish student-athlete frequency of stress and the recovery associated activities (the stress recovery state).

4.2 Methods

4.2.1 Study Design

A prospective longitudinal cohort design was used to monitor the stress and recovery states of nine student-athletes within an Irish third level institution during a 12-week period. The procedure received ethical approval by the University Social Research Ethics Committee (Appendix D).

4.2.2 Participants

This study was advertised at the High-Performance university gym. Nine student-athletes volunteered to take part in this study (4 females, 5 males) competing in a variety of sports (table 4.4). All participants were selected on the basis they were competing at a national level. The participants were different from the ones taking part in the first study.

Participants	Sport	Gender	Age
Athlete 1	Soccer	Male	22
Athlete 2	Hockey	Male	20
Athlete 3	Golf	Female	21
Athlete 4	Athletics	Female	19
Athlete 5		Female	19
Athlete 6	Rowing	Male	18
Athlete 7		Female	20
Athlete 8		Male	23
Athlete 9		Female	23

Table 4.4 Participants

4.2.3 Instrument

The Recovery Stress Questionnaire for Athletes (RESTQ-Sport 52) was developed by Kellmann et al. (2001) to measure various stress states and recovery activities. Composed of 53 questions (the first question is considered a practice question and is disregarded in the analysis) and using a seven-point Likert scale, participants are asked to respond to an item identifying with an activity or condition over the past 3 days/night (see appendix A).

The questionnaire was administered via paper format for practical reasons. The participants were handed the questionnaire and were asked to complete it prior to start their warm up session during their evening visit to the High-Performance gym.

The questionnaire was completed at the beginning of every week, once a week and at the start of it, over a period of 12 weeks.

4.2.4 Data Analysis

The RESTQ- Sport 52 questionnaire scores were classified in general stress score (∑ 7 general subscales), general recovery scores (∑ 5 general recovery subscales) (see table 4.2), sport specific stress scores (∑ 3 sport specific stress subscales) and sport specific recovery scores (∑ 4 sport specific recovery subscales) (see table 4.3).

A statistical marker of internal consistency (Cronbach Alpha α) was calculated for each subscale (table 4.5). It is considered as a measure of internal consistency and scale reliability (Cronbach, 1951; Peterson, 1994) and there are some conflicting reports among scholars regarding what would but satisfactory result but an acceptable Alpha would range from 0.60 to 0.95 (Peterson, 1994; Gliem et al., 2003; George, 2011).

4.2.5 Results

All nine subjects successfully completed the questionnaire over a period of 12 weeks resulting in 108 questionnaires. Statistical Package for the Social Sciences version 20.0 was used for data analysis.

The RESTQ-Sport is sensitive to changes in stress and recovery, and any fluctuations are reflected in the general and sport specific stress and recovery state. Any increases/decreases in stress or recovery reflect a frequency of associated activities and indicated by a rise or a decrease in value.

The following figures show the various scores resulting from the 12 measures taken over the course of an academic semester. The noticeable events in the student-athletes' life that took place over the course of this present study were week 8, which is a dedicated week to complete and submit assignments and week 11 which is the start of the study month.

The recovery scales reached a higher result compared to the stress scales (both from a General and Sport specific aspect. Figure 4.4) over the course of the 12 measures, except over the course over the 8th measure (the assignment week) where the General recovery scales were notably lower than the General stress scales. As figure 4.4 represent the sums of all the stress and recovery subscales, it is important to contextualise the score by indicating that (according to the Likert scale of the questionnaire and the amount of subscales) a low to medium score is 0 to 234, while a medium to high score is 235 to 936. This scale provide a greater granularity to figure 4.4 and able to give some depth of interpretation regarding the levels of stress and recovery over the course of an academic semester. As well, it is important to keep in mind that the interpretation of the results and figures 4.4, 4.5, 4.6, 4.7 and 4.8, relies on the variations of the stress and recovery levels. As

indicated by Kellmann et al. (2001), the interpretations of the RESTQ-Sport profile should be focused on the changes over time.

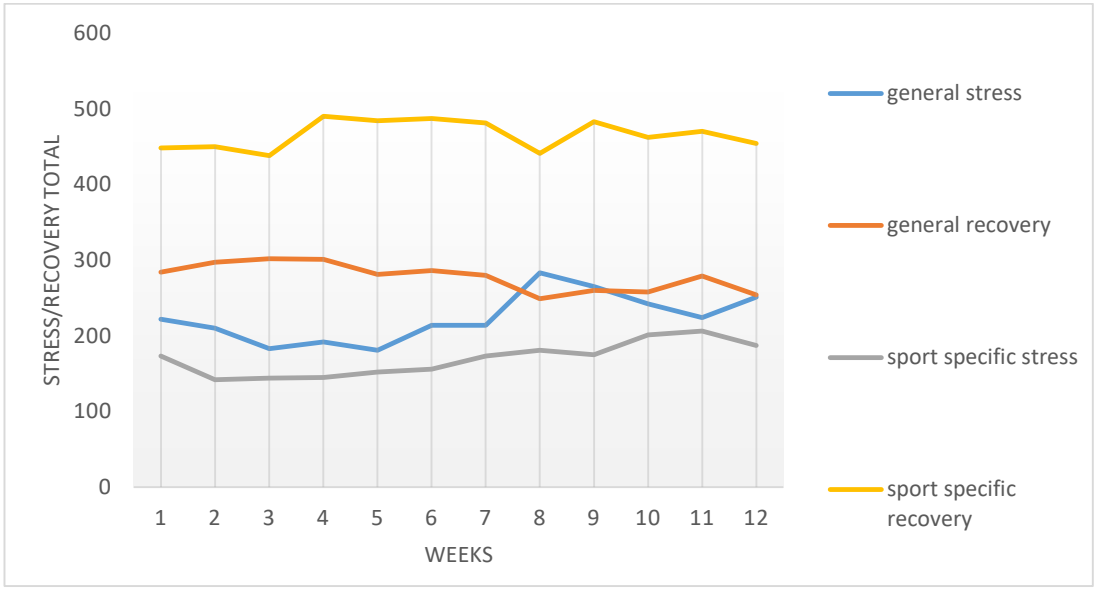


Figure 4.4 Stress recovery balance

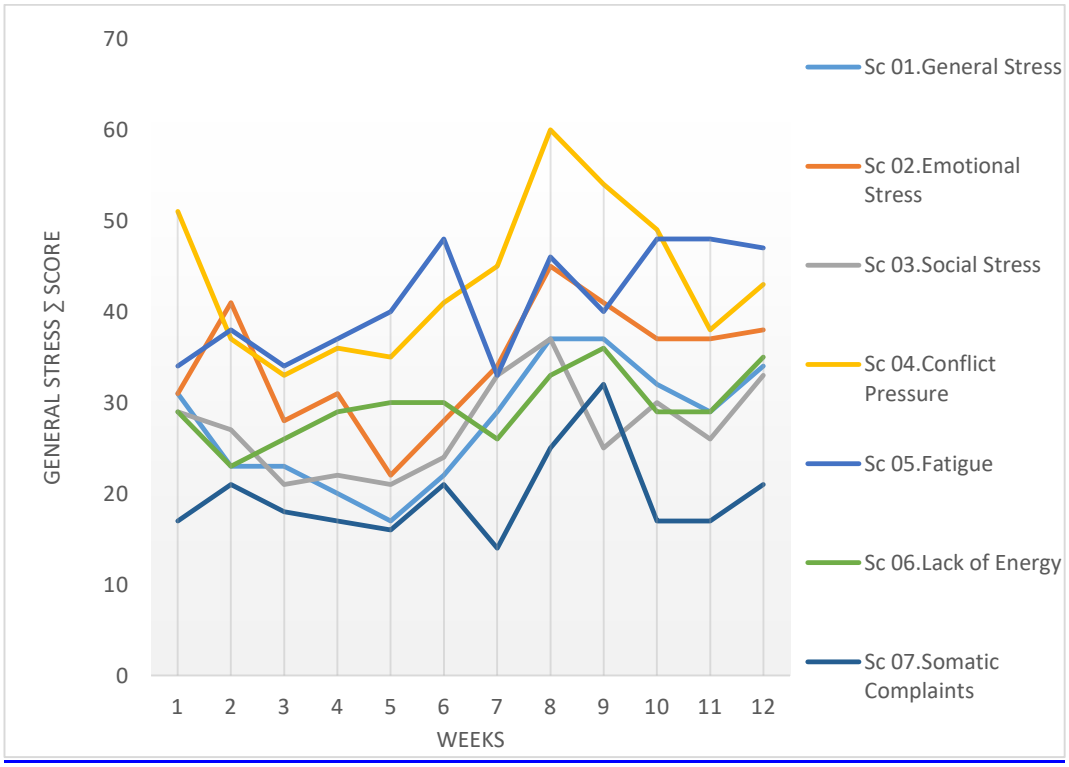


Figure 4.5 General stress subscales

Both scales (general recovery and general stress, Figure 4.4) reached a near perfect balance on the 12th measurement, which was the result of a simultaneous increase in general stress and decrease in recovery scales (the week 11 is the start of the study month prior to the exams period). A notable increase in the overall general stress subscales can be observed as the totality of subscales in the figure 4.5 started to increase from the 7th measurement and peaked at the 8th measurement (with the exception of the somatic complaints and lack of energy subscales who peaked a week later). The majority of these stress subscales, after a slight decrease, re-initiated an increase from week 11.

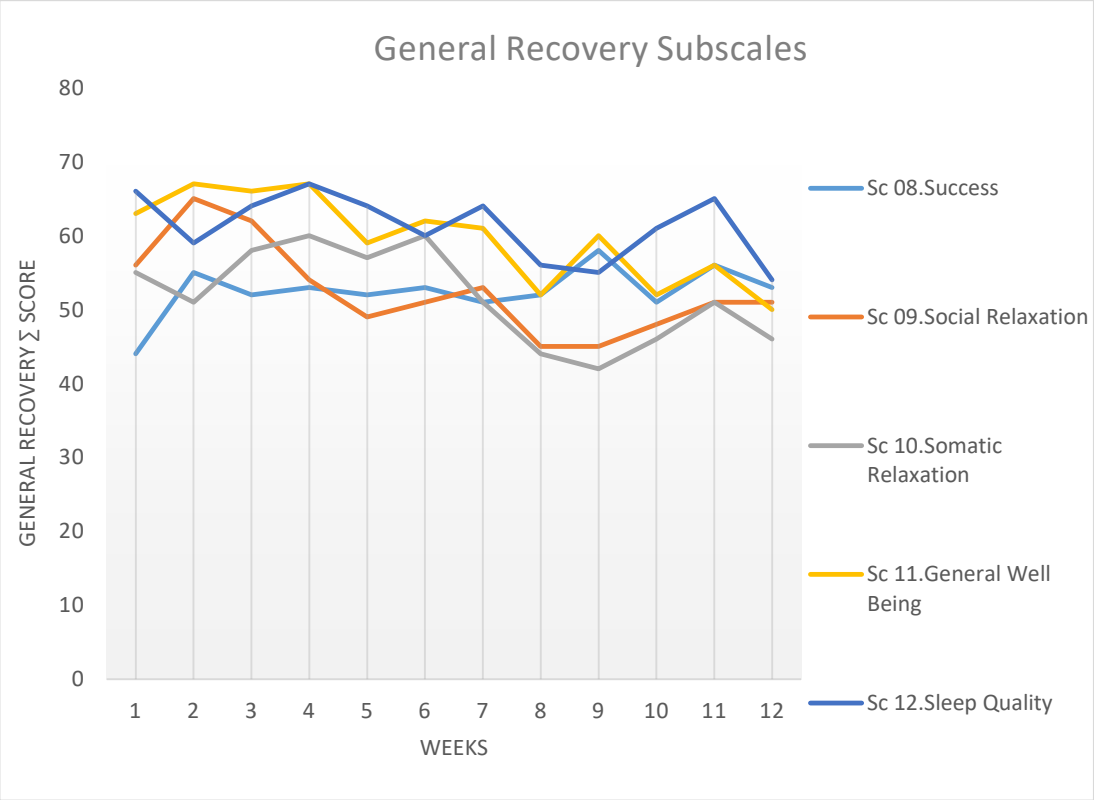


Figure 4.6 General recovery subscales

While most of the scores of these stress subscales decreased from the 8th measurement, the fatigue subscale observed a slight decline but reached a high result at the end of these 12 weeks. However, despite a seemingly high level of recovery across all the general recovery subscales, a decrease in the recovery associated activities can be observed from the 7th measurement. Most of the recovery subscales indicate an increase in recovery but the 11th measurement is the cornerstone to a sharp decrease as the totality of the subscales recovery reached their lowest value by the 12th week (which indicates when put in relation with the general stress subscales) a high-stress low recovery states.

The Sport Specific Recovery subscales (Figure 4.8) remains constant at a high level (despite a decrease at the 8th measurement) while the sport specific stress scales remains low (Figure 4.7).

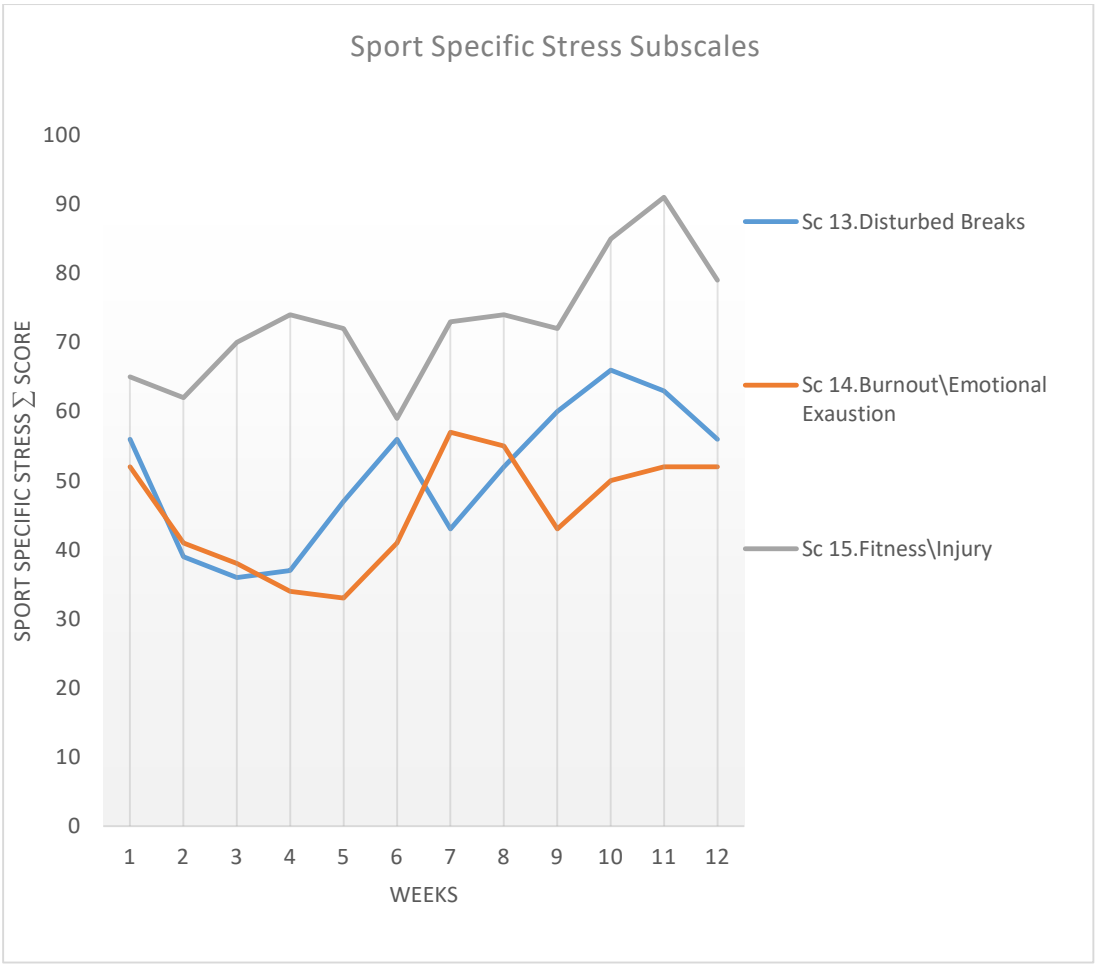


Figure 4.7 Sport Specific Stress subscales

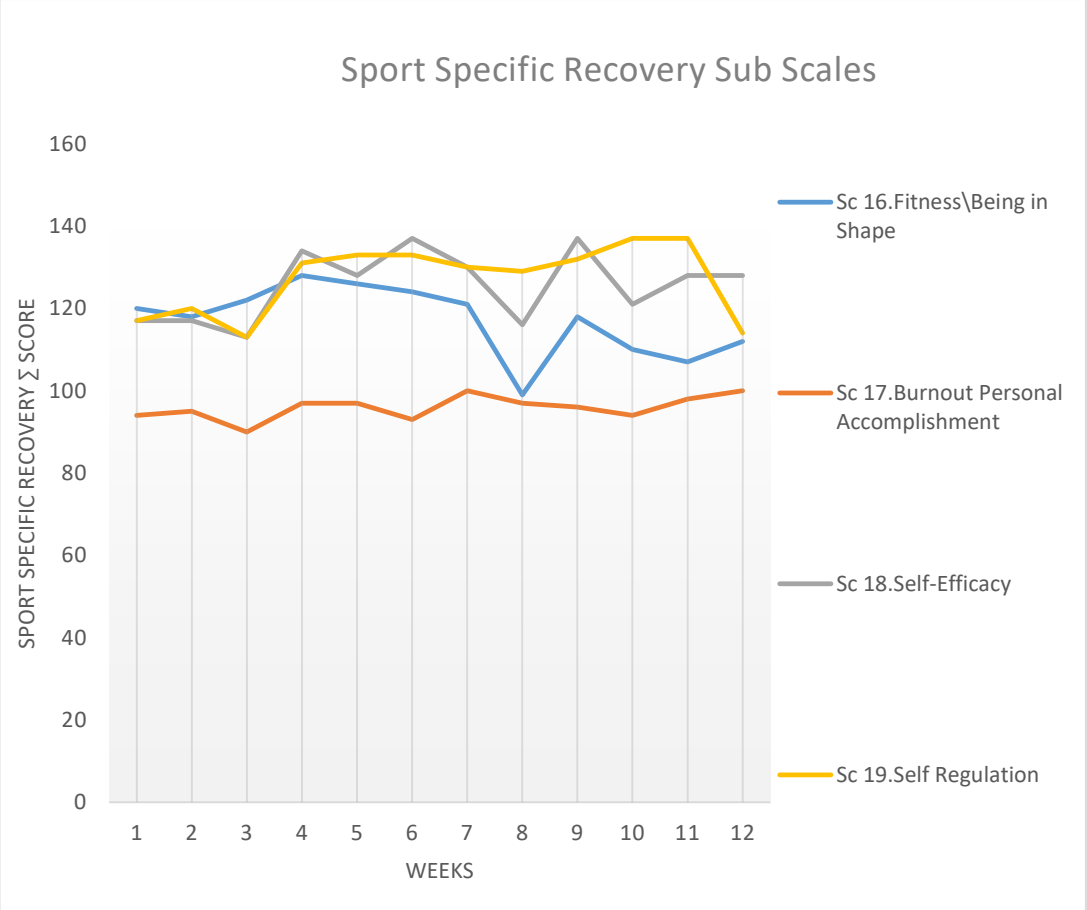


Figure 4.8 Sport Specific Recovery Subscales

The Cronbach α has been calculated for this study (with the low, good and acceptable levels described in page 89). The results from this present study are showing resemblances with the Nederhof et al. (2008) results as a poor Cronbach α is highlighted in the following subscales: lack of energy, physical complaints, success, sleep quality (table 4.5).

	Scale	Cronbach α
1	General Stress	0.789
2	Emotional Stress	0.659
3	Social Stress	0.638
4	Conflicts/pressure	0.695
5	Fatigue	0.747
6	Lack of Energy	0.501
7	Physical Complaints	0.474
8	Success	0.373
9	Social Recovery	0.678
10	Physical Recovery	0.736
11	General Well Being	0.86
12	Sleep Quality	0.507
13	Disturbed Breaks	0.927
14	Emotional Exhaustion	0.819
15	Injury	0.832
16	Being in Shape	0.88
17	Personal Accomplishment	0.743
18	Self-Efficacy	0.893
19	Self-Regulation	0.683

Table 4.5 Internal consistency of the RESTQ-Sport 52 (Highlighted subscales indicate low Alpha)

4.4 Discussion

The aim of this study was to investigate and identify the stress recovery state of nine student-athletes over the course of an academic semester (12 weeks). Various studies have highlighted the high level of elevated distress from the students comparing to the general population (Roberts et al., 1999; Adlaf et al., 2001; Aherne, 2001; Stanley et al., 2002; Adlaf et al., 2005; Robotham et al., 2006). Regardless of a significant amount of empirical studies investigating the stress level among the various student population (Clark et al., 1986; Lo, 2002; Dziegielewski et

al., 2004; Tully, 2004), the dual role of the student-athlete has only been the focus from researchers over the last few years. The main body of research is predominantly focused on student-athletes in North America (Dubuc-Charbonneau et al., 2014; Kaufman, 2014; Kroshus et al., 2017) but a growing body of academic research is starting to look at the European student-athlete (Brown et al., 2015; Murphy et al., 2015; Stambulova et al., 2015; Etéus et al., 2017).

The results of this present study show a distinct rise in the stress levels and decrease in the recovery activities around two distinct periods in the semester. The assignment week (week 8) and the start of the study month (week 11) (figure 4.4) are identified by an increase among a majority of the general stress subscales (table 4.2 and table 4.3 for a description of the subscales) and an increased score in various stressors such as fatigue, conflict/pressure and emotional. The rise of these stressors coincides with a decreased scoring in the general recovery scale, more specifically on the general wellbeing (which measures general relaxation), social (pleasurable social contacts) and somatic relaxation (which indicates the physical wellbeing) scales. This increase in stress and decrease in the recovery scales over a specific period suggests a state of under-recovery and coincide with a precise time at the University where students have to submit various assignments prior to start a month long period of study.

The disturbed general stress recovery states coincide with the sharp increase of the burnout/emotional subscale (scale 14) over the course of week 5 to week 8. Linked

to a decrease in the sense of accomplishment subscale (subscale 17), this fluctuation supports the previous findings from Dubuc-Charbonneau et al. (2014): this study investigated the burnout levels among student-athletes from two Canadian universities. A group of 145 student-athletes completed the Athlete Burnout Questionnaire (ABQ) from Raedeke et al. (2001). This questionnaire incorporates three subscales (emotional and physical exhaustion, reduced personal accomplishment, and sport devaluation) and gives an indication of the level of burnout. Among the 145 student-athletes, 17% scored high on two of the three subscales while 1.4% indicated a high level of burnout by scoring highly on the three subscales. These findings echoed with the results of this chapter: as a decrease in the sense of accomplishment matches with the increase of the emotional subscales, it indicates (as suggested by researchers) that such symptoms are an early indication of burnout (Kenttä et al., 1998; Maslach, 2003; Cresswell et al., 2006). It would mean that the participants of this current study were experiencing an early stage of burnout. A recent study (Drew et al., 2018) conducted among 185 student-athletes in an Irish Higher Education institution investigated the prevalence of symptoms such as anxiety and depression. The results of Drew et al. (2018) presented an increase in stress in student-athletes as 45% of them reported symptoms above the normal range with 31% reported moderate to severe symptoms of depression and/or anxiety.

These results accentuate the student-athlete population at risk of developing some level of psychological distress: as shown by Kenttä et al. (1998) and Dubuc-

Charbonneau et al. (2014), a high level of emotional stress and physical exhaustion linked with a reduced sense of accomplishment are the precursors to the burnout syndrome. The findings of these studies are indicating an identical outcome to this present study, as an increase can be found in the level of emotional stress and fatigue (subscales 05 and 02 as indicated in figure 4.5) and decrease in the sense of accomplishment (subscale 17 as indicated in figure 3.8) over a specific period (week 7 and 8). Overall, it indicates the student-athletes as a population at risk of developing a disturbed wellbeing state (Hwang et al., 2016; Li et al., 2017).

The sport specific section of the recovery stress questionnaire includes seven different subscales (disturbed breaks, burnout/emotional exhaustion, fitness/injury, fitness/being in shape, burnout/personal accomplishment, self-efficacy, self-regulation). It is worthwhile to note that all these subscales scored a high Cronbach alpha score (which is a measure of internal reliability and consistency of the subscales). The Cronbach alpha indicates how reliable the subscales are at measuring what they should. The self-efficacy and disturbed break subscales seem to be the most consistent with a respective score of 0.893 and 0.927 (table 4.5). The disturbed break subscales measure any disturbances/interruptions in the recovery/rest process while the self-efficacy looks at the athlete self-belief in his/her preparation. Self-efficacy can be defined as self-belief in one's competence to accomplish a set of tasks and produce a positive outcome (Bandura, 1977, 1982). Closely linked to an athlete's performance (George, 1994; Schunk, 1995; MacNab, 2015), self-efficacy has shown via a number of studies to have an inverse

relationship between self-efficacy and stress among students (Chemers et al., 2001; Torres et al., 2001; Zajacova et al., 2005). Over the course of the 12 weeks, student-athletes have shown high levels of self-efficacy (subscale 18. Figure 4.8) however, as there is a noticeable increase in the general stress score (Figure 4.4 and 4.5), the self-efficacy and the fitness/being in shape subscales are showing a score decrease over the course of 3 weeks (starting from week 6 to week 8. Figure 4.8). Apart from week 11, which is the start of the study month, the Burnout/personal accomplishment and self-regulation subscales (Figure 4.8) are not showing any notable variation over the course of these 12 weeks. As the self-efficacy subscale in this questionnaire is aimed at an athlete and not specifically at a student-athlete, it is worthwhile to note that it is not a measurement of academic self-efficacy but rather sport specific self-efficacy. Therefore, in that context, the results are showing the participants had a decrease of self-belief in their abilities to be optimally prepared in their athletic training. This result reinforces the link between self-efficacy and stress that has shown by various studies (Jerusalem et al., 1992; Solberg et al., 1997; Zajacova et al., 2005). According to the Lazarus et al. (1984) model of stress and coping, every response to a stressor can be divided into two main categories, an appraisal of the severity of the stressor and how well this stressor can be managed. The ability to evaluate and measure self-efficacy represents a key role in the evaluation and the dealing of the stress. (Lazarus et al., 1984; Brown et al., 2000; Cody, 2013). According to a study investigating the interrelationship between stress appraisal and self-efficacy among 220 undergraduate students in a large North American University, self-efficacy and stress appraisal plays a key role in resilience and the self-concept of an individual

experience a negative life event. It can be expected that individuals will be experiencing a negative life events during their lifetime, and one of the recommendations from Cody (2013) was to teach students life skills to improve self-efficacious behaviours and help them to learn to appraise situations as challenged rather than threats may result in stronger resilience and self-concept (Cody, 2013, p. 37).

4.4.1 The Next Step: Can the Questionnaire Usability be Improved and be Adapted to the Student Athlete?

A psychometric evaluation of the Recovery Stress Questionnaire (RESTQ-Sport) performed by Davis et al. (2007), highlighted several discrepancies within the construct validity of the recovery stress questionnaire. Davis et al. (2007) conducted several factor analysis studies (exploratory and confirmatory) to verify the factor structure but several subscales and items lacked statistical validity, as Davis et al. (2007) could not confirm the 19 subscales construct as advanced by Kellmann et al. (2001). One of the main recommendations of the Davis et al. (2007) study would be to perform a factor analysis with a heterogeneous group of athletes to verify the factor structure. While it is evident the RESTQ-Sport is a proven tool to measure under-recovery, it has so far not be proven if the subscales and items are adapted to the student-athletes population and its complex nature. The lack of internal consistency shown by some subscales (in similarity with some of the results described by Nederhof et al. (2008)), require further statistical analysis (based on

original samples) to determinate a suitable and reliable monitoring tool (Davis et al., 2007).

Various factors, such as question design factors and time burden (see figure 4.9), influences the efficacy and implementation of athlete self-report measures (Saw, 2017). In a study conducted among 30 athletes, coaches and support staff at a national sporting institute, Saw et al. (2015) investigated the key factors influencing the implementation of an athlete self-report measure. The question design factors are essential to the relevance of the questionnaire and irrelevant ambiguous questions can dilute the effectiveness and the purpose of the questionnaire. Equally, the time burden and the duration required to fill in the questionnaire can lead the athlete to normalise the responses and directly influence the quality of the data output. Her recommendation following this study is that in order to gain quality data, it is important to reduce the burden on the athlete by minimising the numbers of questions and carefully consider the importance of them.

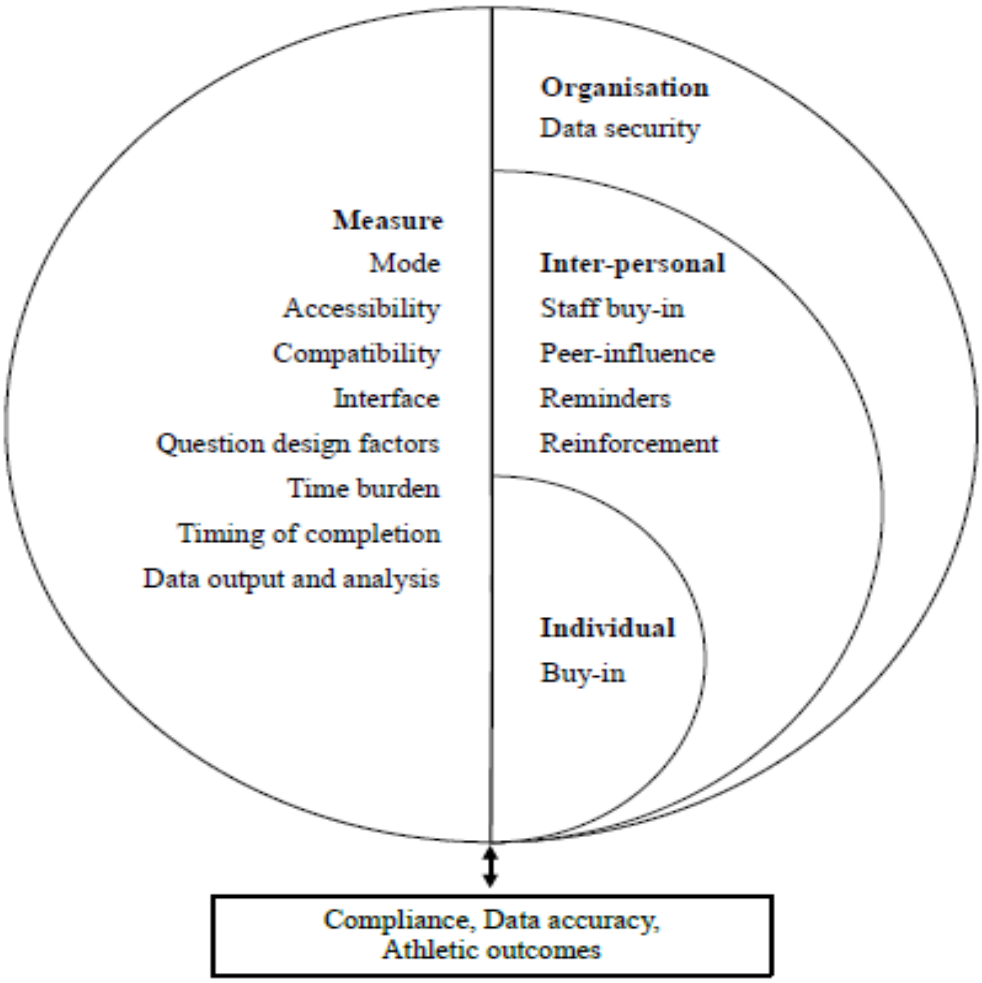


Figure 4.9 Factors influencing an athlete self-report measures, taken from Saw (2017)

Over the duration of the 12 weeks of this study, the student-athletes noticed the length of the questionnaire and more specifically the duration needed to complete it (around 6 to 8 minutes). Kellmann et al. (2001) state the time to fill in the questionnaire should be 8 to 12 minutes at the start but should be diminishing as the athlete becomes familiar with it. During the 12 weeks of this current study, the student-athletes taking part in it noticed at first the length of this questionnaire and then at times started to rush to complete the questionnaire. Despite having explained at length the purpose of the questionnaire to the student-athletes, some

student-athletes felt it was not adapted to their sports and the necessary time to complete the questionnaire was too long. This concern has been highlighted by multiple studies (Mykolas, 2010; Taylor et al., 2012; Saw, 2017) as athletes are showing a strong desire to have monitoring tools customised to their sports and subsequent demands.

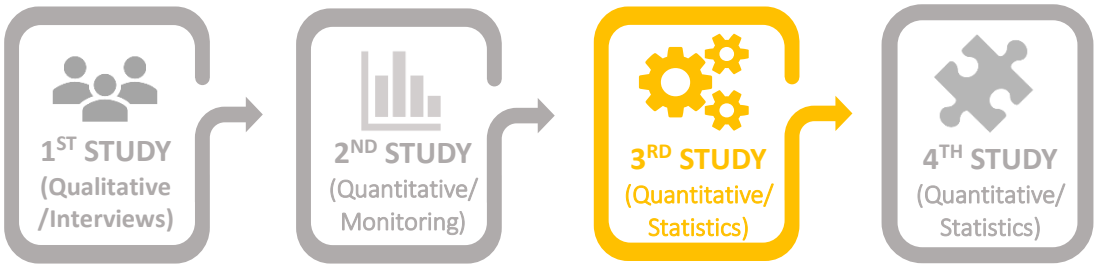
4.5 Conclusion

This chapter indicates the usefulness of a monitoring tool to observe the Irish student-athlete stress recovery state over a period of time. The primary finding of this present study is in line with the existing current academic literature: the student-athlete is exposed at key moments over the course of an academic year to various increased stressors (such as conflicts/pressure, fatigue and emotional stress) and a decrease in recovery (which is a state that can be defined as under-recovery). In line with the existing academic research, it indicates the student-athlete population at risk of being exposed to multiple stressors. Stress possesses a multidimensional aspect and the present study showed the benefit of monitoring the stress levels of a student-athlete on a regular basis so they can incorporate adequate recovery to help them to optimise their stress recovery state. The secondary finding of this present study showed a lack of internal validity by some of the subscales and addressed the importance to use meaningful subscales in accordance to a specific population and as highlighted by Saw (2017), it is crucial to verify the efficacy and validity of any self-report monitoring tool. It subsequently indicates the need to investigate, with a bigger sample, this monitoring questionnaire in greater depth by performing further statistical analysis. A

statistical analysis of this questionnaire would allow as well for a greater evaluation of the recovery stress questionnaire subscales design factors and give the opportunity if needs to be, to re-align it in accordance to the Irish student-athlete population needs and specificity.

CHAPTER 5

Study Three: Analysis and Development via Principal Component Analysis of a Monitoring Questionnaire aimed at the Irish Third Level Student-Athletes: the Recovery Stress Questionnaire (RESTQ-Sport 52)



Research Question

What are the experiences of the student athlete in balancing athletic demands, academics demands and social environment in an Irish higher education system?

Research Question

What are the stressors affecting the student athlete over the course of an academic semester?

Research Question

Is it possible to offer a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete?

Research Question

Validation of a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete

5.1 Introduction

5.1.1 Monitoring Tools and the Subjective Measurement of Performance.

A wide range of monitoring tools are available to coaches, athletes and sports scientists (Taylor et al., 2012; McGuigan, 2017). However, despite a lack of scientific confirmation of the effectiveness of some of the monitoring tools (such as the custom designed questionnaires) and markers used routinely to predict training efficacy and athlete readiness, monitoring systems are an integral part of an athlete training plan (Taylor et al., 2012; Gastin et al., 2013; Saw, A. E. et al., 2015; McGuigan, 2017). The monitoring process has to be able to quantify athlete activity and reflect athlete adaptation in relation to the training stimulus exposure (Borresen et al., 2009).

The self-report measure incorporates a four-step process (see figure 5.1) involving the recording of the data, the review of the data collected, a subsequent contextualisation leading to a greater knowledge regarding the athlete (allowing an ongoing communication process between support staff and athlete), then the review act in itself with the feedback to the athlete, coach, support staff and the tailoring of the training based on the data collected (Saw, 2017).

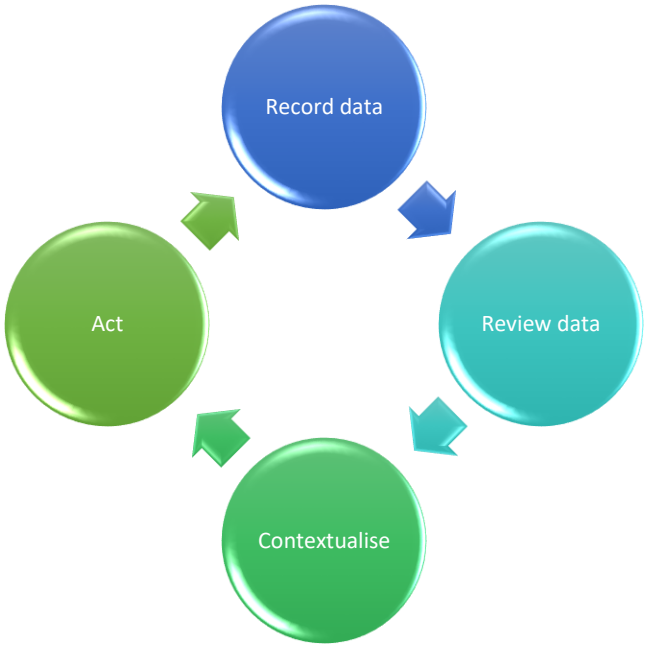


Figure 5.1. The self-report measure 4 steps process, taken from Saw (2017)

As well, the monitoring process must be adapted to the required activity: some of the monitoring tools might not be suitable for the activity (eg. GPS and resistance training) and for the athlete and/or athletic program requirements (Saw, 2017).

Subjective measures have demonstrated sensitivity to acute and chronic training variations (both from a physical and psychological wellness standpoint) with a superior accuracy compared with objective measures (Gastin et al., 2013; Saw, A. E. et al., 2015), which provides support for practitioners to use subjective measures as part of the athlete monitoring protocol. In light of this context, the athlete self-report measure (a term incorporating the athlete subjective physical, psychological and/or social wellbeing (Saw, 2017)) has been one of the preferred monitoring tools

from coaches and sport science support staff (Meeusen et al., 2012; Taylor et al., 2012).

It is apparent, that self-report questionnaires have been one of the most common tools used to monitor fatigue responses. But more surprisingly, a study conducted among 100 coaches and support staff in a high-performance institution, highlighted a tendency to create and implement their own custom designed form with a greater focus on muscle soreness, physical fatigue and general wellness (Taylor et al., 2012). Some self-report questionnaires lack sport specificity and require an inordinate completion time, which pushes the support staff to design a customised questionnaire in order to alleviate the risk of athlete non-compliance and the subsequent lack of data quality (Taylor et al., 2012; Saw, 2017). It has been emphasized that while custom designed forms remain a preferred monitoring tool (for practical reasons), a lack of empirical evidence regarding the effectiveness of this modified questionnaire highlights the need to provide an adapted, concise and more practical, empirically validated monitoring tool (Taylor et al., 2012).

5.1.2 The Stress Recovery Questionnaire: a Colossus with Feet of Clay?

One of the issues encountered by the questionnaire lies in the fact that some of the questionnaire statements have a different meaning: if the athlete competes in a team or individual sport, or the time-context at the time of the questionnaire completion (eg: I had to perform well in front of others. The meaning would be

different between training and competition) have a potential impact on some of the reliability/consistency statistical test. This was the precise problem encountered during the monitoring study explained in chapter 3: some student-athletes participating in individual sports did not feel some of the questions were relevant to their sport and after a few weeks started to complain about the length of the questionnaire. As highlighted by Saw (2017), an athlete self-report measure should be "athlete centred" as it should be cohesive, practical and relevant in order to develop compliance, interest and subsequently data quality.

From a practical perspective, this questionnaire might not be suited to be used on a daily/regular basis with some specific populations (Taylor et al., 2012; Saw, 2017) as the nucleus of this questionnaire (the general stress and recovery section, originally created by Kallus (1995)) was not designed with a specific population in mind. The concept behind the design of this module intended to reveal a more granular answer to the question "how are you?" (Kellmann et al., 2001, p. 1). The later addition of the sport specific module, allowed the questionnaire to be used among athletes and assess the stress and recovery state over a period of time. Despite being one of the leading subjective measurements of stress and recovery, the questionnaire with its lack of sport specificity and the lengthy amount of time required to complete it, can push practitioners to modify it and subsequently design their own custom questionnaire (Taylor et al., 2012; Gastin et al., 2013).

The construction and development of the RESTQ-Sport have been using various athletic samples from England, Germany and Canada over a course of 10 years. The initial statistical analysis performed by Kellmann et al. (2001) and more specifically the level of reliability and internal consistency among the subscales of the questionnaire was deemed acceptable by Kellmann et al. (2001) as the majority of the subscales with a Cronbach's alpha α (Cronbach, 1951) ranged above 0.7. However, it is worth noting that some subscales (conflicts/pressure, lack of energy, success, disturbed breaks and burnout/personal accomplishment) have presented a reliability slightly below Cronbach α = 0.7 and could lead to a limited interpretation (Kellmann et al., 2001). Similar issues have been encountered in chapter 3: after analysis the internal reliability of the subscales, most of the scales scored above 0.6 but 4 of them reached of 0.5 and lower (see table 4.12) as the subscale lack of energy scored 0.50, physical complaints 0.47, success 0.37 and sleep quality 0.50. It is worth noting that among the four subscales scoring a low Cronbach alpha, two subscales (lack of energy and success) had a low result in the initial study from Kellmann et al. (2001). As the purpose of a Cronbach alpha calculation is to measure the internal consistency of a scale and to identify to which extent the items in the test measure are able to measure the same concept (Tavakol et al., 2011), a low alpha could indicate that the test assumptions are not met.

The original validation study (see figure 5.2) conducted by Kellmann et al. (2001), looked at the structural validity of the subscales by using a prospective power analysis method to identify the subscales and then used a Principal Components

Factors Analysis followed by a Varimax rotation. A Varimax rotation is a popular Principal Component Analysis technique used when data reduction is a prime concern (Bryant et al., 1995; Costello et al., 2005). The prospective power analysis method (otherwise called *a priori* method) has attracted criticism (Davis et al., 2007; Martinent et al., 2014) as the analysis was not empirically driven by the items within the subscales and therefore resulted in a lack of items validation. Moreover, the RESTQ-Sport has recently found criticism in terms of reliability, as a study (Davis et al., 2007) could not confirm the 19 sub-scales factorial structure from Kellmann et al. (2001) but confirmed the 2 factors structure (Stress and Recovery).

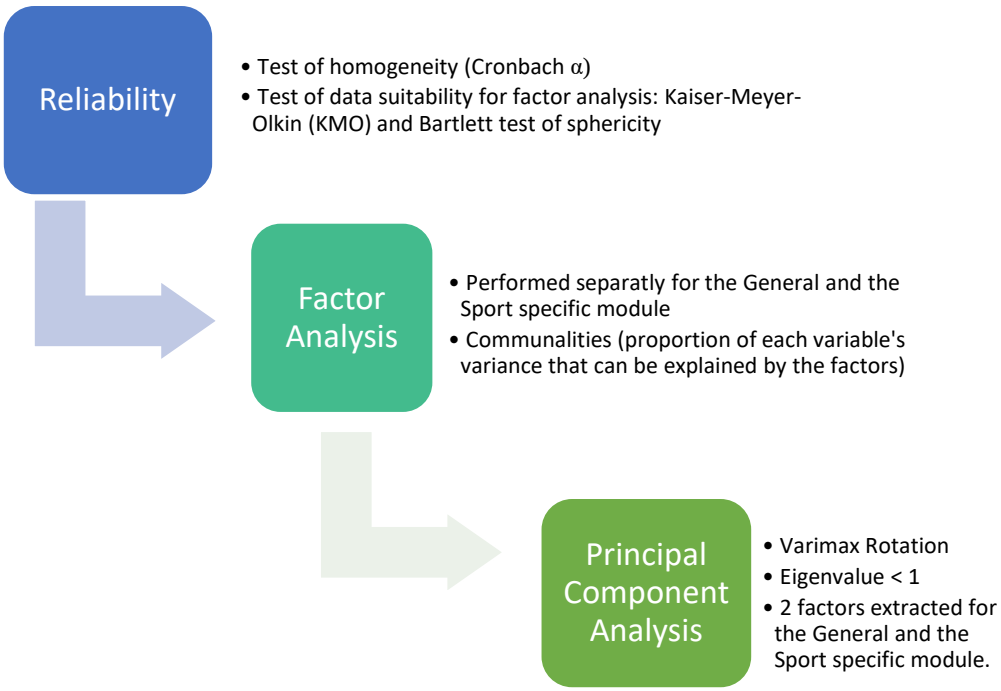


Figure 5.2. Statistical analysis process used by Kellmann et al. (2001)

The questionnaire REST-Q Sport 52 scales have shown temporal stability over three days as test-retest reliability of the subscales (and not the whole questionnaire) remains strong over a short period of time (from 24 hours to 3 days) with a high correlation over 0.70 (for most scales) but suffers a decline in reliability afterwards (Kellmann et al., 2001). The duration required to complete the questionnaire is around 6 to 8 minutes and should slightly decrease after taking the test repeatedly according to Kellmann et al. (2001).

This purpose of this study is twofold: a) To determine the subscales reliability with an Irish Third Level student-athlete population, following the same process as Kellmann et al. (2001). b) Re-evaluate the actual RESTQ-Sport questionnaire by using the statistical analysis feedback.

5.2 Method

5.2.1 Participants

Student-athletes (n = 174) competing in Rugby, Soccer, Athletics and Gaelic sport whilst studying at an Irish Third level institution volunteered for this study. The subjects were selected on the basis that those student-athletes competed at a national level. The student-athletes voluntarily participated in this study and filled this questionnaire anonymously once, using an online platform or via a paper format (as preferred) using the stress recovery questionnaire (RESTQ-Sport 52)

from Kellmann et al. (2001). As the data collection was conducted anonymously and aimed at evaluating a self-report measure reliability and validity across a specific population, it did not allow for differentiation between genders, age, academic levels (1st year, 2nd year, postgraduate...) or sporting levels.

5.2.2 Measure

The self-measure monitoring questionnaire used in this chapter is identical to the one used in chapter 3. The RESTQ-Sport 52 is composed of 19 scales (see table 4.2 and 4.3 for the subscales details) and divided into 2 categories: (a) the 'general stress and recovery', which is made of 12 scales (24 nonspecific items), and (b) 'the sport specific stress and recovery' made of 7 scales (28 sport-specific items). Questions are answered on a 7 points Likert-type scale with a score ranging from 0: never to 6: always. The purpose of this questionnaire is to discern the recovery stress state of the athlete over a temporary period of time (the past three days/nights) (Kellmann et al., 2001).

5.2.3 Procedure

University sport development officers and club coaches were contacted directly and asked to disseminate to the student-athletes via email, a document explaining the purpose of the study (in accordance with the Ethical Standards of the University)

and a direct link to the online questionnaire (Appendix E) stored using the survey website SurveyMonkey. Over the course of the first week in December, student-athletes had the choice as well to either fill in the questionnaire online or via a paper format during their visit to the University High-performance gym. Subsequently, 174 student-athletes filled in the questionnaire anonymously. As the test-retest reliability has shown strong results over 3 to 4 days (Kellmann et al., 2001), the data collection among the student-athletes was condensed over that time span. In order, to streamline the quality of the data, the student-athletes were asked to fill in this questionnaire in the evening prior to starting a training session.

5.2.4 Statistical Analysis

The Rest-Q 52 structural integrity was examined firstly by conducting an analysis of internal reliability by performing a Cronbach Alpha measurement (Cronbach, 1951), then in order to measure the adequacy of the data, a Keyser-Meyer-Olkin (KMO) and Bartlett's test were conducted prior to the Principal Component Analysis. The communalities extraction performed during the factor analysis indicate how well the items correlates with all the other items.

As the purpose of this study is to assess the subscales reliability/validity (and not the items of the questionnaire) within the two-factor structure proposed by Kellmann et al. (2001) (and consequently its effectiveness among a population of Irish student-athletes in a third level institution), it was important to replicate the

same method and approach used by Kellmann et al. (2001). As such, the initial statistical analysis used a Principal Component Analysis followed by a Varimax Rotation separately for the General and Sport Specific parts and the same approach has been used in this study. A fixed number of factors (two) was attributed at the start of each Principal Component Analysis. As part of the Principal Component Analysis, a loading score is attributed to the subscales within each factor after the Varimax rotation: this loading represents to what degree the relationship of the variable is within each pattern. For example, the subscale Fatigue in figure 5.9, has a loading of 0.794 in factor 1 (which is the stress factor), which indicates a high relationship within the stress factor.

The number of subjects used in this study (174) is comparable to the subject numbers used by Kellmann et al. (2001) in his studies. However, other similar studies have used greater numbers (n = 585 subjects for Davis et al. (2007) and n = 294 subjects for Gonzalez-Boto et al. (2008)).

The sample size has long been a subject of debates among scholars: Gorsuch (1983) preconize a minimum of n = 100 subjects, Guilford (1954) recommends n = 200, Goldberg et al. (1994) between n = 500 and 1000 subjects. However, MacCallum et al. (1999) showed a lack of validity of the common rules of thumb (MacCallum et al., 1999, p. 84) and demonstrated (via a Monte Carlo study) that a high communality and well-defined factors had a greater impact than the sample size.

All analysis conducted used SPSS version 20.0 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.)

In accordance with Gorsuch (1983), Tabachnick et al. (2007) and Reise et al. (2000), strict criteria have been established regarding this principal components analysis (see figure 4.3):

- **Cronbach Alpha:** Only the subscale scoring 0.6 and above were retained for the Principal Component Analysis. It is a measure of internal consistency and scale reliability.

- **KMO and Bartlett's test:** the Principal Component Analysis can only be conducted once the suitability of the data was assessed and within the acceptable threshold.

- **Communalities:** according to Velicer et al. (1998), a communality of 0.8 or greater is considered "high". However, such a result in social science are rarely attainable, therefore an acceptable communality of 0.5 has been established for this study (MacCallum et al., 1999; Costello et al., 2005; Child, 2006; Kline, 2014). The communality explains how well an item correlates with all the other items.

- **Load factor:** the factor loading indicates how strong the relationship is between the item and the factor. It must be greater than 0.4 and any cross-loading items (a cross-loading is when an item load on two factors at the same time) will be removed from the analysis (Costello et al., 2005; Tabachnick et al., 2007) and a new analysis will be performed.

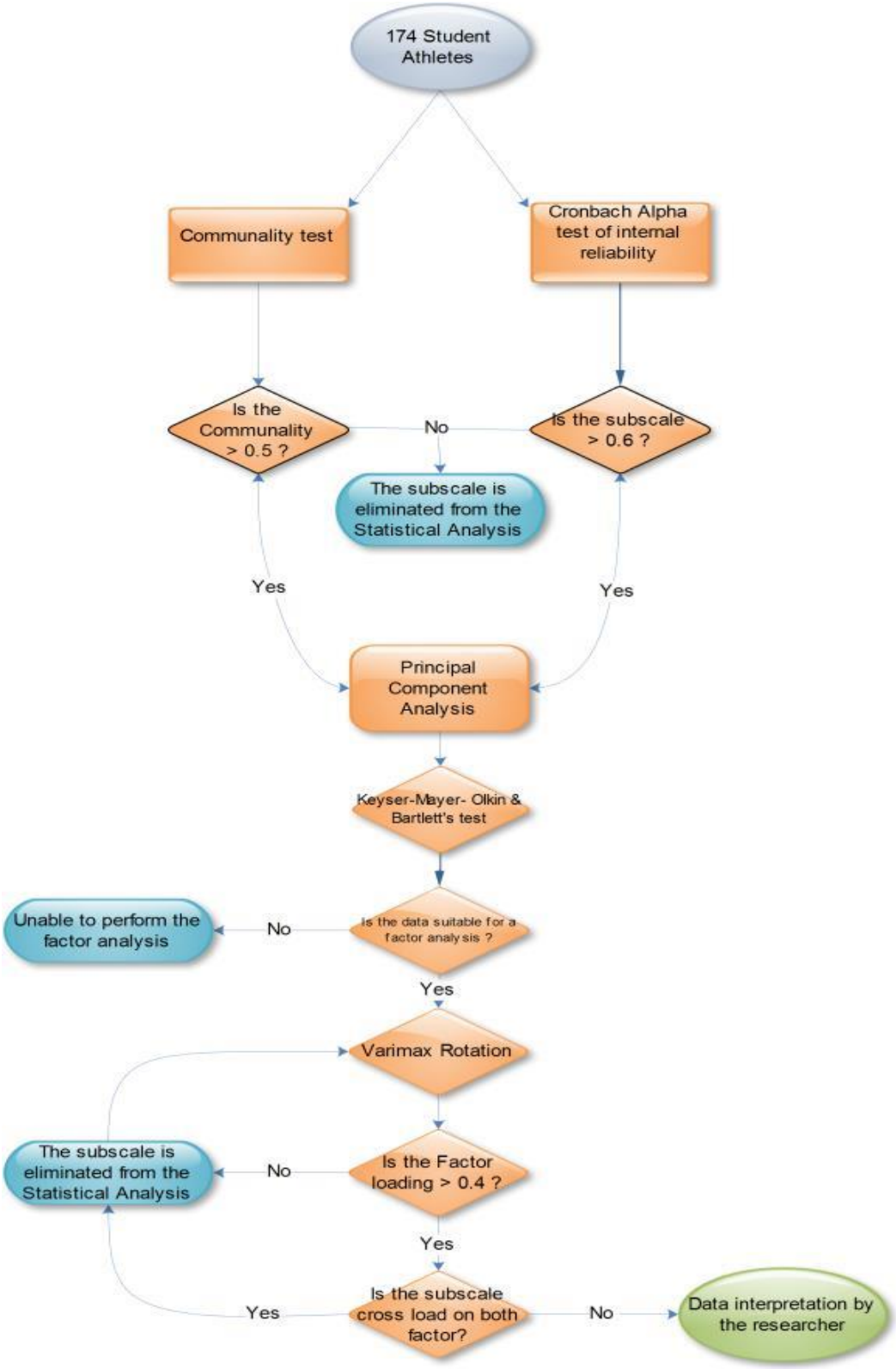


Figure 5.3. Statistical analysis flow chart

5.3 Results

5.3.1 Internal Consistency

Cronbach α value of the subscales scores ranged from 0.40 to 0.87 (see table 5.1). Such results are in agreements with some of the findings from the original authors of the questionnaire who found out that scales such as conflicts/pressure, success, burnout/personal accomplishment, lack of energy, disturbed breaks and personal accomplishment had Cronbach α values slightly below the acceptability of 0.7 (Kellmann et al., 2001). Scales such as lack of energy, physical complaints and success scored a poor Cronbach α (0.54, 0.40 and 0.41 respectively) while scales such as social stress (0.66), conflicts/pressure (0.60), fatigue (0.67), social recovery (0.65), sleep quality (0.65) and disturbed breaks (0.69) scored in the 0.6 range. It is worth noting that despite being routinely used as a measure of internal consistency and described as being able to "provide a good estimate of reliability" (Nunnally et al., 1994), psychometricians (Peterson, 1994; Loewenthal, 2001; Sijtsma, 2008, 2009) have warned about the Cronbach α limitations and what is defined as an acceptable reliable alpha α (Peterson, 1994; Lance et al., 2006; McCrae et al., 2011; Hair Jr et al., 2016). Therefore, in order to have a meaningful and reliable data for this study, any values above 0.6 have been kept for the Principal Component Analysis and the Varimax rotation.

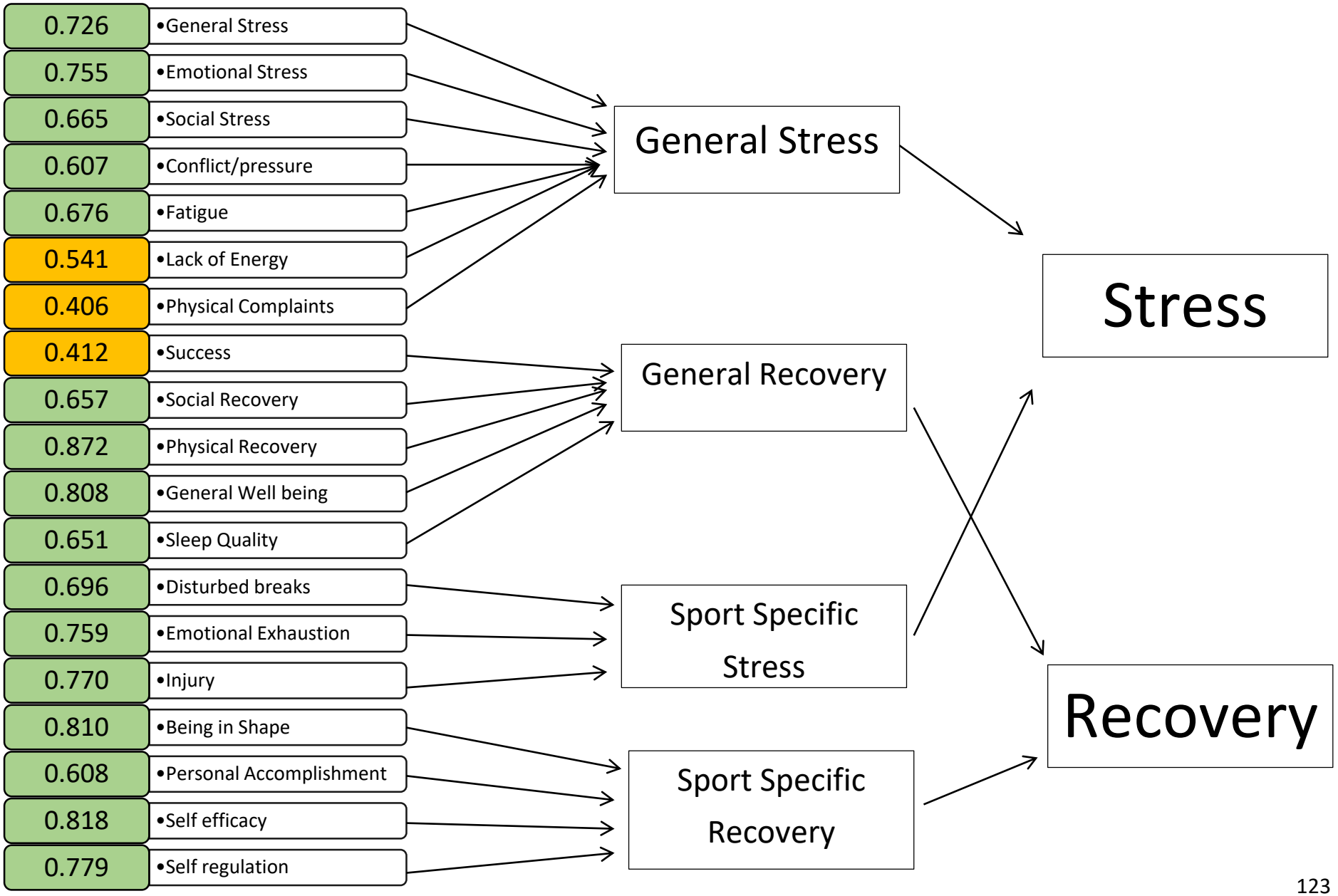


Table 5.1 Subscales internal consistency (Cronbach α)

5.3.2 Factorial Structure

The first step was to assess the factorability of the data by using Bartlett's test of sphericity (Bartlett, 1954) and the Kaiser-Meyer-Olkin (KMO) (Kaiser, 1970, 1974) measure of sampling adequacy. The Bartlett test of sphericity provides statistical significance that a correlation exists among the variables, and in order for the factor analysis to be appropriate, the value should be significant ($p<0.05$). Kaiser-Meyer-Olkin (KMO) index which is a measure of sample adequacy should be ranging between 0 and 1 with a minimum value of 0.6 (Tabachnick et al., 2001).

The Bartlett test of sphericity (Bartlett, 1954) returned $p < 0.05$ for the General and Sport scales and KMO reached a value of 0.825 for the General scales and 0.755 for the Sport scales. These results reached statistical significance and support the use of a factor analytical model with this data set. The communalities (see table 5.2 and 5.3), which represents to what extent an item is correlated to all other items have been calculated for the general and specific scales.

There is no agreement in relation to an absolute communalities threshold (Velicer et al., 1998; MacCallum et al., 1999; Tabachnick et al., 2001; Preacher et al., 2003; Gagne et al., 2006) but high communalities (> 0.5) explain a high relationship with the other analysed variables. The Sport specific communalities (Table 5.3) are relatively high with results ranging from 0.575 (Scale 15 Injury) to 0.811 (Scale 18 Self-efficacy) while the General scales (Table 5.2) communalities are showing a

range of results from a low 0.391 (Scale 7 Physical Complaints) to 0.791 (Scale 1 General Stress). In order to conduct a meaningful factor analysis, the scales scoring a low communality (< 0.5) were not included in the subsequent factor analysis (conducted with the factor rotation in tables 5.4, 5.5, 5.6 and 5.7).

Communalities General Scales		
	Initial	Extraction
1.General Stress (14,16)	1.000	.791
2. Emotional Stress (3,20)	1.000	.678
3. Social Stress (13,22)	1.000	.661
4. Conflicts/Pressure (7,25)	1.000	.596
5. Fatigue (10,18)	1.000	.713
6. Lack of Energy (6,23)	1.000	.439
7. Physical Complaints (9,12)	1.000	.391
8. Success (11,24)	1.000	.547
9. Social Recovery (2,8)	1.000	.700
10. Physical Recovery (4,21)	1.000	.521
11. General Well Being (5,17)	1.000	.749
12. Sleep Quality (15,19)	1.000	.596

Table 5.2 Communalities for the **General Stress and Recovery** subscales

Communalities Sport Specific		
	Initial	Extraction
13. Disturbed Breaks (27,34,42,48)	1.000	.671
14. Emotional Exhaustion (30,39,44,52)	1.000	.668
15. Injury (26,33,40,49)	1.000	.575
16. Being in Shape (29,37,45,51)	1.000	.779
17. Personal Accomplishment (31,36,46,53)	1.000	.660
18. Self-Efficacy (28, 35,41,47)	1.000	.811
19. Self-Regulation (32,38,43,50)	1.000	.745

Table 5.3 Communalities for the **Sport Specific Stress and Recovery** subscales

The statistical method used by Kellmann et al. (2001) is the principal components analysis (PCA) and the intent of this statistical approach is to test the correlational structure of the data set against a hypothesised structure (Fox, 1983; Bryant et al., 1995; Thompson, 2004). This type of factorial analysis is regarded as most appropriate when the prime concern is data reduction (Hair et al., 1998).

The prime concern of this research is to outline the subscales with an acceptable level of internal consistency (> 0.6), a communality greater than 0.5 and a load factor greater than 0.4. With these given overall indicators, a Varimax rotation was performed (tables 5.5, 5.6, 5.7 and 5.8) on the nine general scales falling within these parameters (three subscales were removed due to a low Cronbach α as seen

in table 5.1, page 120). The load factor cut off point was chosen (0.4) according to Hair et al. (1998) and Comrey et al. (2013) suggestions. It took several steps and the eliminations of multiple subscales that did not meet the minimum criteria to reach a coherent factor structure (see flow chart, page 118). The eigenvalue for each component is listed in table 5.4. and 5.5 and as the eigenvalue represents the amount of the total variance explained by each factor, only factors with an eigenvalue of 1.0 or more are retained for investigation (Pallant, 2013). With the final rotation, the first factor for the general subscales (see table 5.4) has an eigenvalue of 1.97, explaining 39.42 % of the variance. Factor two has an eigenvalue of 1.62 accounting for 32.47 % of the variance. The sport specific stress and recovery has the first factor (see table 5.5) with an eigenvalue of 2.94 which account 42.05 % of the variance. The eigenvalues for the second factor is 1.96 and account for 28.09 % of the variance.

Total Variance Explained (General scales)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.278	45.567	45.567	2.278	45.567	45.567	1.971	39.423	39.423
2	1.317	26.335	71.902	1.317	26.335	71.902	1.624	32.479	71.902
3	.609	12.175	84.077						
4	.453	9.059	93.136						
5	.343	6.864	100.000						

Table 5.4 Total Variance General Stress and Recovery (Final rotation)

Total Variance Explained sport specific

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.069	43.849	43.849	3.069	43.849	43.849	2.944	42.050	42.050
2	1.841	26.296	70.145	1.841	26.296	70.145	1.967	28.095	70.145
3	.686	9.800	79.945						
4	.466	6.664	86.609						
5	.439	6.270	92.879						
6	.276	3.936	96.816						
7	.223	3.184	100.000						

Table 5.5 Total Variance Sport Specific Stress and Recovery (Final rotation)

The rotated component matrix for the General section (see table 5.6) is showing a subscales structure different from the initial study from Kellmann et al. (2001) as only 5 subscales are being retained (due to a lack of correspondence with the criteria established for the factor analysis).

The Sport Specific Subscale structure was identical to Kellmann et al. (2001) two factor structure, the factor 1 explained 42.05 % of the variance and the factor 2, 28.09 % (see table 5.5). The rotated component matrix (see table 5.7) is showing a subscales structure comparable to the initial study from Kellmann et al. (2001).

5.4 Discussion

The results of this factor analysis, while using the same approach as Kellmann et al. (2001), does not reach the same findings: as the two factor structure stress and recovery remains the same (due to the nature of the statistical process used), the structure of the General Recovery and Stress scale is substantially different. As shown in tables 5.6, 5.8 and figure 5.4, the final result is showing a different subscales structure than the original one proposed by Kellmann et al. (2001).

Rotated Component		
	Component	
	1	2
5. Fatigue (10,18)	.794	
4. Conflicts/Pressure (7,25)	.822	
3. Social Stress (13,22)	.750	
9. Social Recovery (2,8)		.918
11. General Well Being (5,17)		.839

Table 5.6 Rotated component General Stress and Recovery (Final Rotation)

The Principal Component Analysis conducted is showing a disparity in the structural integrity of the RESTQ-Sport 52, more specifically within the General subscales. It is undeniable that the two-factor structure (stress and recovery) makes it a valid

instrument to measure under recovery. However, it is interesting to note that various statistical analysis studies using different types of statistical approaches (Davis et al., 2007; Nederhof et al., 2008; Martinent et al., 2014) reached disparate outcomes. While more research of Martinent et al. (2014) and Nederhof et al. (2008) showed a sufficient reliability and validity for the RESTQ-Sport questionnaire, Davis et al. (2007) reached a different conclusion and proposed eight general subscale and six sport specific subscales, therefore failing to confirm the original factor structure. However, both Davis et al. (2007) and Martinent et al. (2014) admitted to some limitations of their research with the use of specific populations (Martinent et al. (2014) used table tennis players aged from 13 to 19 years old while Davis et al. (2007) had High-Performance athletes (aged from 13 to 34 years old) training at a Canadian national sport centre). Both authors agreed on the need for further research by including a sample of athletes competing in a greater variety of sports. The present study took into account those suggestions by conducting a factor analysis using a heterogeneous sample of student-athletes (174 student-athletes competing across five different sports).

It is not surprising that scales such as fatigue (pressure in school/work impacting sleep and generate stress), social recovery (pleasant social interaction connected to relaxation) and general wellbeing (high spirit, relaxation) (Kellmann et al., 2001) are showing a high load in this study. Wilson et al. (2005), Humphrey et al. (2000); DiPaolo (2017) have identified these items as an integral part of the student-athlete lifestyle balance. However as the subscale 12 (sleep quality) loaded negatively on

Factor 1 (the stress factor) and did not load on Factor 2 (the recovery factor), it makes this subscale hard to validate as the factor solution indicates the sleep subscale as a stress component and not as recovery (as originally structured in the RESTQ-Sport) and was therefore removed for the final new suggested model fit questionaire . An identical finding regarding this subscale has been shown by Davis et al. (2007) and has been described as both unreliable and lacking validity (Davis et al., 2007, p. 932).

The analysis of the sport specific section of the questionnaire (see table 5.7) is clearly showing the 7 subscales structure as the structure advanced by Kellmann et al. (2001): the internal consistency indicated an acceptable Cronbach α (Table 5.1) and the rotated component indicates strong results with all the subscales loading accordingly to their stress and recovery factors.

Rotated Component		
	Component	
	1	2
18. Self-Efficacy (28, 35,41,47)	.895	
19. Self-Regulation (32,38,43,50)	.861	
16. Being in Shape (29,37,45,51)	.838	
17. Personal Accomplishment (31,36,46,53)	.811	
13. Disturbed Breaks (27,34,42,48)		.819
14. Emotional Exhaustion (30,39,44,52)		.795
15. Injury (26,33,40,49)		.756

Table 5.7 Rotated component Sport Specific Stress and Recovery (Final Rotation)

The self-efficacy (how convinced is the athlete that he/she is optimally prepared) and self-regulation (use of mental skills to set goals and progress) subscales scored a high loading which would suggest the mental preparation and readiness plays a pivotal role in the stress recovery balance of the student-athletes. The concept of self-efficacy can be defined as one's self-belief in one's ability to successfully produce a course of actions in order to complete a specific task (Bandura, 1977, 1982). The use of self-efficacy measurement tools has been shown to be an effective indicator of academic success (Lent et al., 1986; Multon et al., 1991) and in some circumstances more efficient than stress measurement to predict grades and academic outcomes (Zajacova et al., 2005).

This topic of wellbeing for the student-athlete has been deeply explored (Jordan et al., 1990; McKenna et al., 2004; Burns et al., 2013; MacNab, 2015; Golby et al., 2016) and the high loading of some of the subscales dealing with this area confirms the importance of defining a relevant monitoring tool. The student-athlete and wellbeing state has been highlighted as a crucial state in two independent studies investigating the Irish student-athletes. One of the studies investigated depressive and anxiety symptoms among 185 student-athletes in a large Irish University. The findings of this study indicated that 31 % of student-athletes had moderate to severe symptoms of depression (Drew et al., 2018). Another study highlighted similar results: in a longitudinal research conducted in an Irish university over a 13 week season, among the 38 student-athletes taking part in this research, 37 % showed mild-to-moderate symptoms of depression. The findings of those two

projects conducted in the Republic of Ireland; reinforce the necessity to monitor the wellbeing state of an Irish student-athlete.

5.6 Conclusion

This chapter investigated, via a statistical analysis, the reliability and suitability of a self-measure monitoring instrument investigating the stress recovery states among student-athletes in an Irish Higher Education institution. The findings of this study indicate a lack of suitability of some of the subscales and the statistical analysis conducted suggests an improved model fit for this stress recovery self-measure report in line with the observed specificities of a specific population (see table 5.8 and figure 5.4).

However, in order to validate this questionnaire and verify the efficacy of these subscales, a new study with a different statistical method and another sample (as advised by Davis et al. (2007) and Martinent et al. (2014)) would be appropriate to evaluate the effectiveness of this monitoring tool among the student-athlete population. The next chapter of this doctoral thesis will follow those recommendations and will aim to consolidate the findings of this chapter by conducting a further investigation (Study 4).



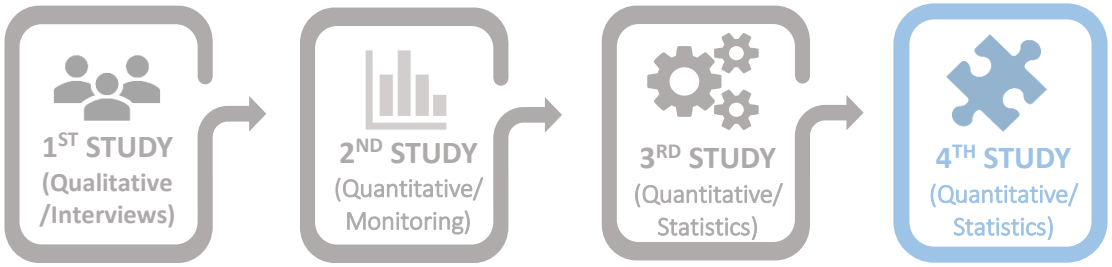
Figure 5.4 RESTQ-Sport 52 and the new model fit subscales

New Model Fit Stress Recovery Questionnaire							
General				**Sport Specific**			
Stress		***Recovery***		***Stress***		***Recovery***	
Subscales	**Questions**	**Subscales**	**Questions**	**Subscales**	**Questions**	**Subscales**	**Questions**
1. Social Stress	7. I was annoyed by others 10. I was upset	**4. Social Relaxation**	2. I laughed 3. I had a good time with my friends	**6. Disturbed Breaks**	13. I could not get rest during the breaks 20. I had the impression there were too few breaks 28. Too much was demanded of me during the breaks 34. The breaks were not at the right times	**9. Fitness/ Being in Shape**	15. I recovered well physically 23. I was in a good condition physically 31. I felt very energetic 37. My body felt strong
2. Conflict/ Pressure	4. I was worried about unresolved pressure 11. I felt under pressure	**5. General Well Being**	3. I was in good spirits 4. I was in good mood	**7. Burnout/ Emotional Exhaustion**	16. I felt burned out by my sport 25. I felt emotionally drained from performance 30. I felt that I wanted to quit my sport 38. I felt frustrated by my sport	**10. Burnout/ Personal Accomplishment**	17. I accomplished many worthwhile things in my sport 22. I dealt very effectively with my teammates problems 32. I easily understood how my teammates felt about things 39. I dealt with emotional problems in my sport very calmly
3. Fatigue	6. I was dead tired after work 9. I was overtired			**8. Fitness Injury**	12. Parts of my body were aching 19. My muscles felt stiff or tense during performance 26. I had muscle pain after performance 35. I felt vulnerable to injury	**11. Self-Efficacy**	14. I was convinced I could achieve my set goals during performance 21. I was convinced that I could achieve my performance at any time 27. I was convinced that I performed well 33. I was convinced that I had trained well
						12. Self-Regulation	18. I prepared myself mentally for performance 24. I pushed myself during performance 29. I psyched myself up before performance 36. I set definite goals for myself during performance

Table 5.8 New model fit stress and recovery monitoring questionnaire

CHAPTER 6

Study Four: Validity of a Monitoring Questionnaire Measuring Stress and Recovery among the Irish Student-athlete



Research Question

What are the experiences of the student athlete in balancing athletic demands, academics demands and social environment in an Irish higher education system?

Research Question

What are the stressors affecting the student athlete over the course of an academic semester?

Research Question

Is it possible to offer a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete?

Research Question

Validation of a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete

6.1 Introduction

The purpose of Study Four is to examine and validate via a statistical analysis, the new shortened questionnaire developed from the principal component analysis performed on the RESTQ-Sport 52 stress and recovery questionnaire from Kellmann et al. (2001) in the fourth chapter of this thesis. The subscales identified in the previous chapter of this current thesis showed sensitivity and relevance to the student-athlete stressors and recovery associated activities. The shortened questionnaire resulting from the previous statistical analysis keeps the initial two-factor structure (stress and recovery) of the questionnaire. However, in order to confirm the factorial validity of this shortened questionnaire, a statistical analysis with a new heterogeneous sample of student-athletes and using a different statistical method than the one employed by Kellmann et al. (2001) is required (an Exploratory Factor Analysis will be used in this chapter as explained in greater details below) .

Academic research revealed the uniqueness of the stressors affecting the student-athlete (Etzel et al., 1996; Hill et al., 2001; Miller et al., 2002; McKenna et al., 2004; Wilson et al., 2005; Loughran et al., 2008; Lu et al., 2012; Brown et al., 2015; Hwang et al., 2016), but despite growing research in this area, there are to date, very few subjective monitoring scales designed with the student-athlete in mind. Multiple subjective tools (such as the Perceived Stress Scale, Daily Analyses of Life Demands for Athletes, Recovery Stress Questionnaire for Athletes, Acute Recovery and Stress Scale, Multi-Component Training Distress Scale) are able to assess stress and

burnout among athletes (Cohen et al., 1983; Rushall, 1990; Kellmann et al., 2001; Main et al., 2009; Kölling et al., 2015). However, the objective of these self-report measures is to focus on the training stressors experienced by the athlete (Lu et al., 2012). While there is an undeniable benefit to incorporate these subjective self-measures in an athlete training environment (Saw, 2017), the particular nature of the student-athlete and their unique stressors does not necessarily find some relevance with the self-measures tools designed for athletes. The Life Events Scale for Collegiate Athletes developed by Petrie (1992) was developed to monitor the student-athlete life stress and the impact of a negative life stress on the likelihood of injuries. However, the lack of relevant subscales addressing some of the student-athlete specific stressors (such as academics and social) made this instrument not entirely suitable for the student-athlete population. The College Student-athletes' Life Stress Scale (Lu et al., 2012) is another attempt to assess the student-athletes' life stress and with an adequate factorial structure, it supports the reliability of this self-measure report. However, the student-athlete population used for this study were elite athletes in a Taiwan university, and student-athletes in a different culture, environment and socioeconomic context, may encounter different challenges (Etzel et al., 1996; Watt et al., 2001; Loughran et al., 2008; Lu et al., 2012). As well, the subscales of this self-measure tool only focus on the stressors and not on the stress recovery balance. So far, the development of a stress and recovery self-measure monitoring tool specifically aimed at the Irish student-athlete has not been proposed.

The aim of this chapter is twofold: 1. to validate with a new heterogeneous group of student-athletes, the subscales preliminarily highlighted in the statistical analysis in the fourth chapter of this study. 2. To confirm the construct validity of the two structure of stress and recovery for this self-measure tool.

6.2 Method

6.2.1 Measure

Following a principal component analysis of the Recover-Stress Questionnaire for Athletes (RESTQ-Sport 52), and a subscales reduction in line with the feedback provided by the statistical analysis, a questionnaire with 12 subscales and 39-items has been used for this present study (Table 5.8. Page 136). This stress recovery questionnaire used the same format as the RESTQ-Sport 52 and questions are answered on the same seven-point Likert scale. The first question is a “warm-up” question and is not incorporated in the analysis. The 12 subscales are divided between three general stress subscales (1. Social stress, 2. Conflict/pressure, 3. Fatigue), two general recovery subscales (4. Social relaxation, 5. General wellbeing), three sport specific stress (6. Disturbed breaks, 7. Burnout/emotional exhaustion, 8. Fitness injury) and four sport specific recovery subscales (9. Fitness/being in shape, 10. Burnout/personal accomplishment, 11. Self-efficacy, 12. Self-regulation).

6.2.2 Participants and Procedure

The participants for this current study (n = 165 student-athletes) is a pool of student-athletes competing in Rugby, Soccer, Athletics and Gaelic sport whilst studying at an Irish third level institution. In order to keep uniformity with the study conducted in the fifth chapter, this current study has been performed at the same time period as the previous study (over a time span of 3 to 4 days, during the first week of December 2016). Some of the participants used in the previous study have been involved in this study as they were still student athletes. As such, all the participants were selected as they were competing at a national level.

In line with the fifth chapter of this current thesis, University sport development officer and Club coaches were contacted directly and asked to disseminate to the student-athletes via email, a document explaining the purpose of the study (in accordance with the Ethical Standards of the University. See appendix E) and a direct link to the online questionnaire. In order to conform with the study conducted in the previous chapter, the participants of this present study were:

- Selected from the teams already involved in Chapter 5
- Voluntarily participated in this study
- Answered this questionnaire once using an online platform or via a paper format (as preferred).

6.2.3 Statistical Analysis

The aim of this chapter is to verify the internal validity and the structural integrity of the two factor structure (stress and recovery) of the 12 subscales questionnaire suggested in the fourth chapter. An Exploratory Factor Analysis method was used over Principal Confirmatory Analysis as the prime aim of this chapter is to assess the validity of the subscales from the new questionnaire (The EFA was used as it was not a replication study and as the number of constructs/underlying factor structure were already identified). A maximum likelihood analysis with oblique rotation and two fixed factors was conducted to verify: 1) The adequate loading of the subscales on the stress and recovery structure 2) The strength of the correlations between the subscales. The maximum likelihood method was the preferred statistical methods as it allows for a significant testing of factors loading and correlation among factors (Cudeck et al., 1994). Cronbach alpha values (Cronbach, 1951) and inter items correlation values (Briggs et al., 1986) were calculated for internal consistency. The inclusion of inter items correlation provides a greater interpretation of internal reliability as a small number of items within a scale can give a low Cronbach alpha (Starkweather, 2012; Dunn et al., 2014). In order to assess the factorability of the data, Bartlett's test of sphericity (Bartlett, 1954) and the Kayser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1970, 1974) have been again used. The KMO index suggests a minimum of 0.6 and a significant Bartlett's test ($p<0.5$) for an appropriated factor analysis (Tabachnick et al., 2007).

6.3 Results

6.3.1 Internal Consistency

The Cronbach's alpha score was above 0.60 for the majority of the subscales (Table 6.1). One subscale scored below the 0.60 thresholds with 0.52 for the social stress subscale. However in order to obtain a greater depth, an inter-item correlation was conducted (which measures to what extent a score on one subscale is related to all of the other subscales)and the results obtained were greater than $r = 0.20$ which is the recommended minimum value (Clark et al., 1995) (Table 6.2, 6.3, 6.4, 6.5). Therefore, the social stress subscales was retained for the Factor Analysis.

		Cronbach Alpha
General Stress	1. Social stress	0.52
	2. Conflict/Pressure	0.65
	3. Fatigue	0.61
General Recovery	4. Social recovery	0.68
	5. General well being	0.85
Sport Specific Stress	6. Disturbed breaks	0.71
	7. Emotional Exhaustion	0.67
	8. Injury	0.74
Sport Specific Recovery	9. Being in Shape	0.72
	10. Personal Accomplishment	0.65
	11. Self Efficacy	0.77
	12. Self-Regulation	0.70

Table 6.1 Internal consistency (Cronbach α)

Inter-Item Correlation Matrix General Stress			
	Scale 1 social stress	Scale 2 Conflict/ Pressure	Scale 3 Fatigue
Scale 1 social stress	1.000	.568	.415
Scale 2 Conflict/Pressure	.568	1.000	.462
Scale 3 Fatigue	.415	.462	1.000

Table 6.2 Inter-Item Correlation Matrix General Stress

Inter-Item Correlation Matrix General Recovery		
	Scale 4 social relaxation	Scale 5 General well being
Scale 4 social relaxation	1.000	.651
Scale 5 General well being	.651	1.000

Table 6.3 Inter-Item Correlation Matrix General Recovery

Inter-Item Correlation Matrix Sport Specific Stress			
	Scale 6 Disturbed breaks	Scale 7 Burnout emotional exhaustion	Scale 8 Fitness injury
Scale 6 Disturbed breaks	1.000	.529	.432
Scale 7 Burnout emotional exhaustion	.529	1.000	.437
Scale 8 Fitness injury	.432	.437	1.000

Table 6.4 Inter-Item Correlation Matrix Sport Specific Stress

Inter-Item Correlation Matrix Sport Specific Recovery				
	Scale 9 Fitness being in shape	Scale 10 Burnout personal accomplishment	Scale 11 Self efficacy	Scale 12 Self-regulation
Scale 9 Fitness being in shape	1.000	.404	.575	.437
Scale 10 Burnout personal accomplishment	.404	1.000	.493	.399
Scale 11 Self efficacy	.575	.493	1.000	.653
Scale 12 Self-regulation	.437	.399	.653	1.000

Table 6.5 Inter-Item Correlation Matrix Sport Specific Recovery

6.3.2 Factorial Structure

The Bartlett test of sphericity (Bartlett, 1954) reached $p < .05$ for the Sport and General scales. The KMO was 0.602 for the general scales and 0.697 for the Sport scales. The Bartlett test reached statistical significance and the KMO was above 0.6, which supports the use of a factor analytical model with this data set.

The two-factor model (stress and recovery) fitted accordingly within the general and sport specific subscales (Table 6.6 and 6.7). Each factor analysis conducted with the subscales and with the items lead to a two-factor structure. The factor loading

for the subscales and the items of the subscales are showing a factor load above the required acceptable threshold (> 0.40).

	Factor 1	Factor 2
1. Social stress	0.706	
2. Conflict/pressure	0.773	
3. Fatigue	0.633	
4. Social relaxation		0.678
5. General well being		0.989
Eigenvalues	**1.605**	**1.340**
% of Variance	**32.09**	**26.79**

Table 6.6 General subscales factor loadings

	Factor 1	Factor 2
6. Disturbed breaks		0.731
7. Burnout/emotional exhaustion		0.719
8. Fitness injury		0.619
9. Fitness/being in shape	0.624	
10. Burnout/personal accomplishment	0.563	
11. Self-efficacy	0.889	
12. Self-regulation	0.758	
Eigenvalues	**2.118**	**1.528**
% of Variance	**30.25**	**21.85**

Table 6.7 Sport specific subscales factor loadings

6.4 Discussion

The purpose of the fourth study was to examine the validity of the recovery and stress subscales of this remodelled questionnaire. The reliability and internal consistency were acceptable with the majority of the subscales scoring above the Cronbach alpha acceptable level of 0.60. Only one of the social stress subscales scored (with 0.52) below the threshold. The majority of the sport specific level reached a level of 0.70 (except two subscales: emotional exhaustion (0.67) and personal accomplishment (0.65)) while the majority of the general subscales reached a 0.60 and above level (except the social stress subscale with 0.52). These results are in line with the findings from the third and fourth chapters of this present thesis: the general section of the questionnaire reached a lower Cronbach alpha than the sport specific section, which indicates a lack of internal reliability from the general part of the questionnaire. These results are comparable to the findings of Davis et al. (2007) who identified a lower Cronbach alpha for the general subscales comparing to the sport specific subscales. As highlighted by Gonzalez-Boto et al. (2008) and Kallus (1995), one of the reasons for a low scoring subscale could be due to the fact that the construct of the general module is based on a formulated dimension aimed at the general population. As such, the meaning of the questions could have a different interpretation by the athlete population (as well as within the context of this present research, the student-athlete population). From a statistical point of view, the limited number of items within the subscale can result in a low Cronbach alpha (Nunnally et al., 1967; Sijtsma, 2009; Starkweather, 2012; Serbetar et al., 2016) and an inter-item correlation calculation is preferable as it can

provide a greater understanding of the strength of the inter correlations of the subscales (Tabachnick et al., 2001; Starkweather, 2012). In the present study, the inter-item correlation calculated within the two factors component for the general and sport specific subscales indicated a result above the required threshold and directed it to an acceptable level of correlation, which gives support to the reliability of the subscales used in this questionnaire.

The construct validity (the adequate measure of stress and recovery) was also acceptable with a clear distinction between the stress and recovery loading. All subscales loaded accordingly to the stress and recovery structure with an acceptable loading. Again, these findings are in line with the factor analysis conducted by Davis et al. (2007). The Davis et al. (2007) findings from their in-depth statistical analysis indicated that some subscales from the general factor (such as general wellbeing and social relaxation), are a predominant part of the stress recovery balance, as these subscales display the greatest variances within the questionnaire. Study Four finds similar findings as the general wellbeing subscale is showing an extremely strong loading in this statistical analysis. Defined by the World Health Organisation (World Health, 2004) as a key state of an individual that allows that individual to cope with the various life stressors, the wellbeing state has shown a negative relationship with stress among students (Neely et al., 2009). The same negative relationship has been shown with the findings of the fourth chapter of this thesis: over a key period (week 8, which is the assignment week), there is a notable decrease in the wellbeing subscale (Figure 3.5) along with a sharp increase

in the general stress subscales (Figure 4.6. Conflict/pressure, emotional stress, fatigue, physical complaints, lack of energy and general stress). A research study aimed at reducing burnout among student-athletes in a Canadian university (Dubuc-Charbonneau et al., 2015) had student-athletes actively taking part in a person centred self-regulation intervention over the course of an academic year. The results of this study indicated a relationship between a stress reduction and an increase in wellbeing. Within the Republic of Ireland, a study conducted in an third level institution among 185 student-athletes, reported that 31% of these student-athletes exhibited moderate to severe symptoms of depression and/or anxiety (Drew et al., 2018). As it is one of the first studies investigating the mental state and wellbeing Irish student-athletes', it clearly indicates the importance and the fragility of the student-athletes' wellbeing state. Another study investigating anxiety and mental health in Irish student-athletes was conducted over a 13-week season across 38 student-athletes competing in Gaelic sport. The findings indicated that 37% reported a level of mild to moderate symptoms of depression. The findings regarding the wellbeing subscale highlighted in Chapter 3 (Study Two) linked to the results from Dubuc-Charbonneau et al. (2015), Drew et al. (2018) and Sheehan et al. (2018) (who clearly advocates the importance of monitoring the state of student-athlete wellbeing), confirm the importance of the wellbeing subscale in monitoring student-athletes.

Another subscale regularly reaching a high significance in the statistical analysis of this present study is self-efficacy. The fourth chapter (Study 2) of this thesis

highlighted the decrease of this subscale at a key time (week 7) while the majority of the subscales measuring stress increased (from a general and sport specific aspect) over the same time span (Figure 4.5 and 4.7). Chapter five (Study 3) indicated a high factor loading of this subscale (Table 5.7) which is nearly identical to the factor loading of the statistical analysis performed in this current chapter (Table 6.7), indicating this subscale as a strong component in the student-athlete preparation and performance. Since the introduction of the concept of self-efficacy as an important factor in motivational education by Bandura (1977), a body of research indicated the importance of self-efficacy on academic performance (Lent et al., 1986; Multon et al., 1991; Schunk, 1991; Ferrari et al., 1992; Andrew, 1998; Chemers et al., 2001; Lane et al., 2001). As well, self-efficacy has been shown to have an undeniable impact on athletic performance: according to a meta-analysis (45 studies) looking at the relationship between self-efficacy and performance in sport (Moritz et al., 2000), self-efficacy is both a "cause and effect of performance" (Moritz et al., 2000, p. 289). Already highlighted as an important subscale within the Recovery stress questionnaire by Kellmann et al. (2001), the results from this current study emphasize its importance among the Irish student-athletes.

The stressors highlighted in the statistical analysis performed in this chapter mirror some of the findings by previous studies aimed at measuring student-athletes' stress (Lu et al., 2012; Chiu et al., 2016; Hwang et al., 2016; Martin, 2018). For example, a study conducted among 19 967 student-athletes (Hwang et al., 2016) highlighted that wellbeing, self-efficacy and social context (such as peers and

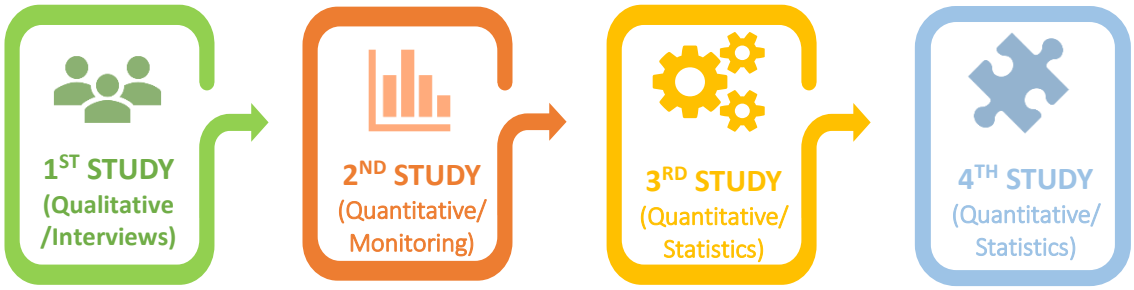
coaches' interactions) were associated with experiencing stress. These stressors are strongly identified in this statistical analysis and reinforce the usefulness of the subscales of this questionnaire aimed at the student-athlete in Ireland.

6.5 Conclusion

From this study (Study 4), it may be concluded that this shortened version of the recovery stress questionnaire developed in Chapter 5 is a valid tool for monitoring the student-athlete. The analysis shows the results display an acceptable level of internal consistency and factorial validity as the subscales loads on a two factor structure and clearly distinguish the stress scales from the recovery scales. As well, the subscales used in this questionnaire are indicating relevance and sensitivity to some of the major stressors affecting the student-athlete population. The few studies looking at the Irish student-athlete population in a Higher Education institution indicated findings that reinforce the usefulness of the subscales of this questionnaire.

CHAPTER 7

Conclusion of the Thesis



Research Question

What are the experiences of the student athlete in balancing athletic demands, academic demands and social environment in an Irish Higher Education system?

Research Question

What are the stressors affecting the student athlete over the course of an academic semester?

Research Question

Is it possible to offer a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete?

Research Question

Validation of a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student athlete

The broad aim of this doctoral thesis was to investigate the struggles encountered by student-athletes in a Higher Education institution in the Republic of Ireland. The first section of this chapter addresses the study's findings via the research questions. The second part looks at the potential limitations and the future directions of this research.

7.1 Overview of Findings

1. What are the experiences of the student-athlete in balancing athletic demands, academic demands and the social environment in an Irish Higher Education system?

Chapter 3 approached this research question with a qualitative study looking into the life of nine student-athletes who were training and studying in a Higher Education institution in the Republic of Ireland. The aim of this study was to provide greater insight and understanding to the unique life of a student-athlete. An analysis of EU member states approach to support student-athletes characterises the Republic of Ireland as "laissez faire" (Aquilina, 2009). It, therefore, positions the student-athlete in Ireland at the opposite end of the support scale compared to their counterparts in a North American context. The findings of the first study in this current thesis highlighted the need for student-athletes to optimise their time

management skills in order to efficiently balance academic and athletic requirements. Quite often, a lack of adequate recovery resulted in cases of overtraining and in some instances, time away from academics. Findings regarding social interactions indicated that in contrast to other research (Parham, 1993; Watt et al., 2001) student-athletes in this study did not find themselves isolated socially from other students. A logical outcome of this first study was to investigate over the course of an academic semester, the various levels of stress affecting the student-athletes and how well they were able to recover.

2. What are the stressors affecting the student-athlete over the course of an academic semester?

The second study (chapter 4) builds on the previous chapter of this thesis which highlighted the student-athletes' exposure to various stressors. Very little academic research has been conducted regarding the stressors affecting the Irish student-athlete. The aims of this second study were twofold: to understand to what extent student-athletes were affected by the various stressors; and (in order to keep an optimum psychophysical state) to establish the quality of the associated recoveries. This study showed fluctuating stress and recovery levels through the semester, linked with key academic activities (assignment weeks and the weeks leading up to exams). The RESTQ-Sport questionnaire was able to accurately monitor stress-recovery states, but feedback suggested participants found the questionnaire too long to complete regularly. Also, some of the statistical results regarding the

internal validity of some of the subscales highlighted some inconsistencies, which warrant further investigation.

3. Is it possible to offer a practical, reliable and suitable monitoring tool focusing on the stress and recovery states to the Irish student-athlete?

The self-measure questionnaire used in the second study of this thesis demonstrated a usefulness for monitoring the stress-recovery state of the student-athlete. However, based on the student-athletes' feedback and the statistical analysis, the exploration of refining this self-measure questionnaire was necessary in order to increase its relevance and adapt it to the Irish student-athlete. The third study was dedicated to a statistical analysis performed across a sample of 174 student-athletes. The statistical analysis results indicated that various subscales did not fit the criteria and an improved fit was suggested. Due to various limitations of the statistical analysis used (the analysis used was identical to the one previously used in the original RESTQ-Sport questionnaire by Kellmann et al. (2001)), it was important to confirm the statistical relevance of these subscales by performing a new analysis with a different method and a new sample of student-athletes. The fourth study conducted a statistical analysis across a sample of 174 student-athletes as the previous study conducted in chapter 4 highlighted the importance of some of the RESTQ-Sport 52 questionnaire subscales and at the same time some inconsistencies regarding their internal validity. The statistical method used in the third study of this thesis (a Varimax rotation) was similar to the one used by

Kellmann et al. (2001), and some previous academic studies aimed at validating the recovery-stress questionnaire (Davis et al., 2007; Nederhof et al., 2008; Martinent et al., 2014) highlighted the limitations of the original statistical method. Instead, these researchers opted for a different statistical method (Maximum Likelihood), which was replicated for this confirmation study.

The findings of this fourth study confirmed the new model fit suggested after the completion of factor analysis in the third study. One of the subscales (social stress) displayed a low Cronbach alpha but an inter-item correlation calculation indicated an adequate level. Some research indicates that a low alpha could be due to a low level of items and in those cases, an inter-item correlation calculation is more suitable (Starkweather, 2012; Serbetar et al., 2016). This statistical analysis reinforced the importance of some subscales (i.e. well-being and self-efficacy) which again find relevance in the research conducted at both worldwide and national levels.

7.2 Original Contribution to Knowledge

Despite a large body of work devoted to the student-athlete profile, most of the research has been conducted across the North American student-athlete population. This research addresses a gap in the academic literature by providing not only an insight into the various challenges confronting the student-athlete in a

Higher Education institution within the Republic of Ireland but also by creating a practical, new questionnaire designed for the Irish student-athlete.

The longitudinal study in Chapter 4 (conducted over the course of an academic semester) highlighted the various stressors affecting the Irish student-athlete and as such, provided richness to the data obtained from the first qualitative study. In this context, this thesis makes an original contribution by extending the knowledge regarding the challenges affecting the student-athlete in an Irish university. Additionally this thesis offers, via various statistical methods, a self-measure monitoring questionnaire designed and developed specifically for the Irish student-athlete, and therefore makes a practical contribution to student-athlete wellbeing.

7.3 Limitations of the Study

There are various limitations to the studies undertaken in this thesis. All the research was conducted in the same Irish Higher Education institution (which limits the generalisation of the studies) and as pointed out by Aquilina (2009), the level of support offered within the Republic of Ireland is provided on an ad hoc basis and could vary greatly between universities. Therefore, the support provided in a different Higher Education institution within the Republic of Ireland may help the student-athlete to alleviate some of the struggles and stressors mentioned in this thesis. The research described in the various chapters of this thesis were cross-sectional and did not take into accounts the various points:

1. Classifications of student-athlete (sports competed in and standard of competitions)

2. Gender (men vs women)

3. Years spent at the university (undergraduate/postgraduate)

It would also be extremely beneficial to conduct longitudinal studies of various duration (either over academic semesters/year(s)) in order to improve the knowledge regarding the multiple stressors affecting the Irish student-athlete. The third chapter of this doctoral study is centred on the need to investigate the first research question (how is the student-athlete able to balance academics, sports and the social spheres). As nine student-athletes were interviewed in one university, a generalisation of these viewpoints is therefore limited and further qualitative research across other Higher Education institutions in the Republic of Ireland would be needed to provide a broader understanding of the Irish student-athlete profile.

The statistical analysis was conducted on the subscales and it would be useful to extend the scope of this statistical analysis to the items of the questionnaire in order to verify the efficacy and strength of these items. Furthermore, the shortened stress-recovery questionnaire would benefit from a series of longitudinal studies to verify 1) the subscales reliability via test-retest and 2) the efficacy of the questionnaire by genders.

7.4 Implications for Future Research

This study fills in a gap in the existing academic literature regarding the struggles encountered by the Irish student-athlete in a Higher Education institution. Overall, this study highlighted a number of issues regarding the Irish student-athlete. As the support structure for student-athletes in the Republic of Ireland is on an ad hoc basis (Aquilina, 2009), it would be beneficial to conduct similar studies regarding the viewpoints of these student-athletes and the type of stressors to which they are subjected over the course of longitudinal studies. The introduction and development of a short self-report measure, specifically aimed at the Irish student-athlete and with a primary focus on the stress and recovery states, is a beneficial tool to help the student-athlete to optimise their psychophysical state. As this self-measure tool is only in its infancy, it would greatly benefit from further study and adaptation to make it more relevant and applicable to teams, individual sports and genders. A comparison study between the subjective measures of this short questionnaire and biomarkers could reinforce the efficacy of this self-measure report.

This doctoral thesis investigates the various struggles encountered by the student-athletes in the Republic of Ireland Higher Education institutions, however, as with any of the challenges encountered, it is important to adopt a proactive approach rather than a reactive one. Student-athletes can only be supported if there is an

awareness and understanding of the challenges they are facing. They act as role models in society and can inspire younger generations to follow in their footsteps. Moreover, student-athlete sporting prowess brings pride and honour to their community and country, and pursuing an education while competing at the highest level brings undeniable challenges. In light of some of this doctoral thesis' findings and the Republic of Ireland's unique socio-economical context, there is a necessity to rethink and redefine the student-athlete support structure system. These student-athletes can potentially be the Irish flag bearers at future Olympic Games and as a nation, it is imperative to empower them to become not only great students but to achieve their potential as high-performance athletes.

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Appendix A. RESTQ-Sport 52 sample questionnaire

In the past (3) Days/nights

1) … I watched TV

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

2) … I laughed

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

3) … I was in a bad mood

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

4) … I felt physically relaxed

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

5) … I was in good spirits

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

6) … I had difficulties in concentrating

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

7) … I worried about unresolved problems

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

8) … I had a good time with my friends

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

9) … I had a headache

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

10) … I was dead tired after work

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

11) … I was successful in what I did

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

12) … I felt uncomfortable

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

13) … I was annoyed by others

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

14) … I felt down

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

15) … I had a satisfying sleep

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

16) … I was fed up with everything

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

17) … I was in a good mood

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

18) … I was overtired

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

19) … I slept restlessly

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

20) … I was annoyed

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

21) … I felt as if I could get everything done

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

22) … I was upset

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

23) … I put off making decisions

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

24) … I made important decisions

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

25) … I felt under pressure

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

26) … parts of my body were aching

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

27) … I could not get rest during the breaks

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

28) … I was convinced I could achieve my set goals during performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

29) … I recovered well physically

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

30) … I felt burned out by my sport

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

31) … I accomplished many worthwhile things in my sport

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

32) … I prepared myself mentally for performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

33) … my muscles felt stiff or tense during performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

34) … I had the impression there were too few breaks

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

35) … I was convinced that I could achieve my performance at any time

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

36) … I dealt very effectively with my teammates' problems

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

37) … I was in a good condition physically

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

38) … I pushed myself during performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

39) … I felt emotionally drained from performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

40) … I had muscle pain after performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

41) … I was convinced that I performed well

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

42) … too much was demanded of me during the breaks

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

43) … I psyched myself up before performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

44) … I felt that I wanted to quit my sport

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

45) … I felt very energetic

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

46) … I easily understood how my teammates felt about things

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

47) … I was convinced that I trained well

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

48) … the breaks were not at the right times

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

49) … I felt vulnerable to injuries

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

50) … I set definite goals for myself during performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

51) … my body felt strong

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

52) … I felt frustrated by my sport

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

53) … I dealt with emotional problems in my sport very calmly

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

Appendix B. New model stress and recovery monitoring questionnaire

In the past (3) Days/nights

1) … I watched TV

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

2) … I laughed

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

3) … I was in good spirits

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

4) … I was worried about unresolved pressure

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

5) … I had a good time with my friends

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

6) … I was dead tired after work

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

7) … I was annoyed by others

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

8) … I was in good mood

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

9) … I was overtired

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

10) … I was upset

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

11) … I felt under pressure

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

12) … parts of my body were aching

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

13) … I could not get rest during the breaks

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

14) … I was convinced I could achieve my set goals during performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

15) … I recovered well physically

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

16) … I felt burned out by my sport

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

17) … I accomplished many worthwhile things in my sport

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

18) … I prepared myself mentally for performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

19) … my muscles felt stiff or tense during performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

20) … I had the impression there were too few breaks

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

21) … I was convinced that I could achieve my performance at any time

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

22) … I dealt very effectively with my teammates problems

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

23) … I was in a good condition physically

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

24) … I pushed myself during performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

25) … I felt emotionally drained from performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

26) … I had muscle pain after performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

27) … I was convinced that I performed well

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

28) … Too much was demanded of me during the breaks

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

29) … I psyched myself up before performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

30) … I felt that I wanted to quit my sport

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

31) … I felt very energetic

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

32) … I easily understood how my teammates felt about things

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

33) … I was convinced that I had trained well

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

34) … The breaks were not at the right times

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

35) … I felt vulnerable to injury

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

36) … I set definite goals for myself during performance

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

37) … my body felt strong

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

38) … I felt frustrated by my sport

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

39) … I dealt with emotional problems in my sport very calmly

0	1	2	3	4	5	6
never	seldom	sometimes	often	more often	very often	always

Appendix C. Ethics

UCC Social Research Ethics Committee (SREC)

ETHICS APPROVAL FORM

Name of applicant	Jean Francois Gomez Date 01/04/14
Contact Details	Email j.gomez@ucc.ie
Department/Unit	Department of Education
Title of project	Interview study of the challenges of being a High Performance Student-athlete

		YES	NO
1	Do you consider that this project has significant ethical implications?		x
2	Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	X	
3	Will participation be voluntary?	X	
4	Will you obtain informed consent in writing from participants?	X	
5	Will you tell participants that they may withdraw from the research at any time and for any reason, and (where relevant) omit questionnaire items to which they do not wish to respond?	X	

6	Will data be treated with full confidentiality / anonymity (as appropriate)?	X	
7	If results are published, will anonymity be maintained and participants not identified?	X	
8	Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)?	X	
9	Will your project involve deliberately misleading participants in any way?		X
10	Will your participants include schoolchildren (under 18 years of age)?		X
11	Will your participants include people with learning or communication difficulties?		X
12	Will your participants include patients?		X
13	Will your participants include people in custody?		X
14	Will your participants include people engaged in illegal activities (e.g. drug taking; illegal Internet behaviour)?		X
15	Is there a realistic risk of participants experiencing either physical or psychological distress?		X
16	If yes to 15, has a proposed procedure, including the name of a contact person, been given? (see no 23)		

DESCRIPTION OF THE PROJECT

17. Aims of the project

To become a top athlete requires time, commitment and carefully planned training. Optimum adaptation to training requires the careful balancing of stress and recovery. A full time professional athlete has the ability and the time to solely focus on the achievement of this fragile equilibrium.
The high level student-athlete has to excel academically and compete to the highest level while being subjected to various stressors and time constraint
This study is looking at the way high level student-athletes balanced their training with academic demands.

18. Brief description and justification of methods and measures to be used (attach copy of questionnaire / interview protocol / discussion guide / etc.)

The study will be carried out by Jean Francois Gomez at the Mardyke Arena, UCC. Semi structured interviews will be conducted with University College Cork student-athletes. An audio recording will be used during those interviews and the grounded theory method from Strauss and Corbin will be used to collect and analyse the qualitative data. This method includes a specific process of open coding, axial and selective coding in order to allow the emergence of a theory.

19. Participants: recruitment methods, number, age, gender, exclusion/inclusion criteria

Forty adult male and female subjects will be recruited by advert at the Mardyke Arena Elite gym. There are no age restrictions but in order to be part of this study the participants have to:

- Compete at national and/or international level.
- Study in a third level institution preferably at the University College Cork

20. Concise statement of ethical issues raised by the project and how you intend to deal with them

There are no ethical issues anticipated with this project

21. Arrangements for informing participants about the nature of the study (cf. Question 3)

The study will be carried out by Jean Francois Gomez (School of Education, UCC). Subjects will be given written details of the study, verbally informed over the requirements and given to opportunity to ask any questions prior to giving signed informed consent.

22. How you will obtain Informed Consent - cf. Question 4 (attach relevant form[s])

Informed consent will be obtained from the subjects following a full verbal and written description of the study.

23. Outline of debriefing process (cf. Question 8). If you answered YES to Question 15, give details here. State what you will advise participants to do if they should experience problems (e.g. who to contact for help).

Subjects will receive a copy of the quotes intended to use in the study and these will be amended if required.

24. Estimated start date and duration of project.

Start date: 14th April 2012

Duration: 2 years

Signed _____ Date _____

Applicant

Notes

1. Please submit this form and any attachments to Dr. S. Hammond, Chair, SREC, c/o Miriam Collins, Office of the Vice President for Research and Innovation, Block E, 4th Floor, Food Science Building, University College Cork, College Road, Cork. Please also forward an electronic copy to srec@ucc.ie

2. Research proposals can receive only provisional approval from SREC in the absence of approval from any agency where you intend to recruit participants. If you have already secured the relevant consent, please enclose a copy with this form.

3. SREC is not primarily concerned with methodological issues but may comment on such issues in so far as they have ethical implications.

This form is adapted from pp. 13-14 of Guidelines for Minimum Standards of Ethical Approval in Psychological Research (British Psychological Society, July, 2004)

Department of Applied Psychology, UCC – Research Projects

SAMPLE INFORMED CONSENT FORM FOR RESEARCH PARTICIPANTS

Information Sheet

Purpose of the Study. As part of the requirements for Master of Philosophy (MPhil) at UCC, I have to carry out a research study. The study is looking at the challenges of a high performance athlete

What will the study involve? The study will involve a one on one semi structured interview. This is interview will not exceed a 45 mn duration.

Why have you been asked to take part? You have been asked because you are competing to national and/or national level in your chosen sport and are studying in a third level institution.

Do you have to take part? Participation is completely voluntary and you are free to withdraw at any point if you wish. The requirements of the study are outlined in this information sheet and you can ask any questions. If you would like to participate we ask you to sign the consent form.

Will your participation in the study be kept confidential? Yes. No clues to your identity appear in any reports or publications following this study. Any extracts from what you say that are quoted in the publications and thesis will be entirely anonymous.

What will happen to the information which you give? The data will be kept confidential for the duration of the study and stored on an encrypted hard drive. On completion of the thesis, they will be retained for a further six months and then destroyed.

What will happen to the results? The results from all the subjects will be collated and analysed. They will be seen by my supervisor, a second marker and the external examiner. The thesis may be read by future students on the course. The study may be published in a research journal.

What are the possible disadvantages of taking part? I don't envisage any negative consequences for you in taking part. It is possible that talking about your experience in this way may cause some distress.

What if there is a problem? If you have a problem at any point you should speak to one of the investigators who will advise as appropriate.

Who has reviewed this study? Approval must be given by the Social Research Ethics Committee before studies like this can take place.

.

Any further queries? If you need any further information, you can contact me: Jean-Francois Gomez (Email: J.gomez@ucc.ie)

If you agree to take part in the study, please sign the consent form overleaf.

Consent Form

I……agree to participate in Jean Francois Gomez's research study.

The purpose and nature of the study has been explained to me in writing.

I am participating voluntarily.

I give permission for my interview with Jean-Francois Gomez to be tape-recorded

I understand that I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating.

I understand that I can withdraw permission to use the data within two weeks of the interview, in which case the material will be deleted.

I understand that anonymity will be ensured in the write-up by disguising my identity.

I understand that disguised extracts from my interview may be quoted in the thesis and any subsequent publications if I give permission below:

(Please tick one box:)

I agree to quotation/publication of extracts from my interview □

I do not agree to quotation/publication of extracts from my interview □

Signed……. Date…….

RS Ver 6 2/11/07

Appendix D. Ethics

UCC Social Research Ethics Committee (SREC)

ETHICS APPROVAL FORM

Name of applicant	Jean Francois Gomez Date 01/04/14
Contact Details	Email j.gomez@ucc.ie
Department/Unit	Department of Education
Title of project	Monitoring study of the levels of recovery in high performance student athletes over a semester.

		YES	NO
1	Do you consider that this project has significant ethical implications?		x
2	Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	X	
3	Will participation be voluntary?	X	
4	Will you obtain informed consent in writing from participants?	X	

5	Will you tell participants that they may withdraw from the research at any time and for any reason, and (where relevant) omit questionnaire items to which they do not wish to respond?	X	
6	Will data be treated with full confidentiality / anonymity (as appropriate)?	X	
7	If results are published, will anonymity be maintained and participants not identified?	X	
8	Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)?	X	
9	Will your project involve deliberately misleading participants in any way?		X
10	Will your participants include schoolchildren (under 18 years of age)?		X
11	Will your participants include people with learning or communication difficulties?		X
12	Will your participants include patients?		X
13	Will your participants include people in custody?		X
14	Will your participants include people engaged in illegal activities (e.g. drug taking; illegal Internet behaviour)?		X
15	Is there a realistic risk of participants experiencing either physical or psychological distress?		X

16	If yes to 15, has a proposed procedure, including the name of a contact person, been given? (see no 23)		

DESCRIPTION OF THE PROJECT

17. Aims of the project

To become a top athlete requires time, commitment and carefully planned training. Optimum adaptation to training requires the careful balancing of stress and recovery. A full time professional athlete has the ability and the time to solely focus on the achievement of this fragile equilibrium.
The high level student athlete has to excel academically and compete to the highest level while being subjected to various stressors and time constraint
This study is looking at the way high level student athletes balanced their training with academic demands.

18. Brief description and justification of methods and measures to be used (attach copy of questionnaire / interview protocol / discussion guide / etc.)

The study will be carried out by Jean Francois Gomez at the Mardyke Arena, UCC. Semi structured interviews will be conducted with University College Cork student athletes. An audio recording will be used during those interviews and the grounded theory method from Strauss and Corbin will be used to collect and analyse the qualitative data. This method includes a specific process of open coding, axial and selective coding in order to allow the emergence of a theory.

19. Participants: recruitment methods, number, age, gender, exclusion/inclusion criteria

Forty adult male and female subjects will be recruited by advert at the Mardyke Arena Elite gym. There are no age restrictions but in order to be part of this study the participants have to:

- Compete at national and/or international level.
- Study in a third level institution preferably at the University College Cork

20. Concise statement of ethical issues raised by the project and how you intend to deal with them

There are no ethical issues anticipated with this project

21. Arrangements for informing participants about the nature of the study (cf. Question 3)

The study will be carried out by Jean Francois Gomez (School of Education, UCC) and Dr John Bradley (School of Education, UCC). Subjects will be given written details of the study, verbally informed over the requirements and given to opportunity to ask any questions prior to giving signed informed consent.

22. How you will obtain Informed Consent - cf. Question 4 (attach relevant form[s])

Informed consent will be obtained from the subjects following a full verbal and written description of the study.

23. Outline of debriefing process (cf. Question 8). If you answered YES to Question 15, give details here. State what you will advise participants to do if they should experience problems (e.g. who to contact for help).

Subjects will receive a copy of the quotes intended to use in the study and these will be amended if required.

24. Estimated start date and duration of project.

Start date: 14th April 2012

Duration: 2 years

Signed _____ Date _____

Applicant

Notes

1. Please submit this form and any attachments to Dr. S. Hammond, Chair, SREC, c/o Miriam Collins, Office of the Vice President for Research and Innovation, Block E, 4th Floor, Food Science Building, University College Cork, College Road, Cork. Please also forward an electronic copy to srec@ucc.ie

2. Research proposals can receive only provisional approval from SREC in the absence of approval from any agency where you intend to recruit participants. If you have already secured the relevant consent, please enclose a copy with this form.

3. SREC is not primarily concerned with methodological issues but may comment on such issues in so far as they have ethical implications.

This form is adapted from pp. 13-14 of Guidelines for Minimum Standards of Ethical Approval in Psychological Research (British Psychological Society, July, 2004)

Last update: 2011-07-19

Consent Form

Investigator: Jean-francois Gomez (School of Education, UCC)

Purpose of the Study. As part of the requirements for Master of Philosophy (MPhil) at UCC, I have to carry out a research study. The study is looking at the impact of stress on recovery of a high performance athlete

What will the study involve? The study will involve you to answer a questionnaire (52 questions) once a week for 10 weeks and to take part in a short (less than 10 mn) at the end of the 10 weeks.

Why have you been asked to take part? You have been asked because you are competing to national and/or national level in your chosen sport and are studying in a third level institution.

Do you have to take part? Participation is completely voluntary and you are free to withdraw at any point if you wish. The requirements of the study are outlined in this information sheet and you can ask any questions. If you would like to participate we ask you to sign the consent form.

Will your participation in the study be kept confidential? Yes. No clues to your identity appear in any reports or publications following this study. Any extracts from what you say that are quoted in the publications and thesis will be entirely anonymous.

What will happen to the information which you give? The data will be kept confidential for the duration of the study and stored on an encrypted hard drive. On completion of the thesis, they will be retained for a further six months and then destroyed.

What will happen to the results? The results from all the subjects will be collated and analysed. They will be seen by my supervisor, a second marker and the external examiner. The thesis may be read by future students on the course. The study may be published in a research journal.

What are the possible disadvantages of taking part? I don't envisage any negative consequences for you in taking part. It is possible that talking about your experience in this way may cause some distress.

What if there is a problem? If you have a problem at any point you should speak to one of the investigators who will advise as appropriate.

Who has reviewed this study? Approval must be given by the Social Research Ethics Committee before studies like this can take place.

.

Any further queries? If you need any further information, you can contact me: Jean-Francois Gomez (Email: J.gomez@ucc.ie)

If you agree to take part in the study, please sign the consent form overleaf.

Consent Form

Monitoring study of the levels of recovery in high performance student athletes over a semester

Investigator: Jean-francois Gomez (School of Education, UCC), Dr. John Bradley (School of Education, UCC)

I……agree to participate in Jean Francois Gomez's research study.

The purpose and nature of the study has been explained to me in writing.

I am participating voluntarily.

I give permission for my interview with Jean-Francois Gomez to be tape-recorded

I understand that I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating.

I understand that I can withdraw permission to use the data within two weeks of the interview, in which case the material will be deleted.

I understand that anonymity will be ensured in the write-up by disguising my identity.

I understand that disguised extracts from my interview may be quoted in the

thesis and any subsequent publications if I give permission below:

(Please tick one box:)

I agree to quotation/publication of extracts from my interview ☐

I do not agree to quotation/publication of extracts from my interview ☐

Signed……. Date…….

Appendix E. Ethics

APPLICANT DETAILS

Name of applicant(s)	Jean Francois Gomez	**Date**	03/11/2015
Department/School/Unit, & Supervisor's Name	Department of Education, Dr. John Bradley, Dr. Fiona Chambers	**Phone**	
Correspondence Address	Mardyke Arena UCC	**Email**	J.gomez@ucc.ie
Title of Project	Stress recovery balance and University College Cork student-athletes		

ETHICAL APPROVAL SELF-EVALUATION

		YES	NO
1	Do you consider that this project has significant ethical implications?		x
2	Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	X	
3	Will participation be voluntary?	X	
4	Will you obtain informed consent in writing from participants?	x	
5	Will you tell participants that they may withdraw from the research at any time and for any reason, and (where relevant) omit questionnaire items to which they do not wish to respond?	x	

6	Will data be treated with full confidentiality / anonymity (as appropriate)?	x	
7	Will data be securely held for a minimum period of seven years after the completion of a research project, in line with the University's Code of Research Conduct?	x	
8	If results are published, will anonymity be maintained and participants not identified?	x	
9	Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)?	x	
10	Will your project involve deliberately misleading participants in any way?		x
11	Will your participants include children (under 18 years of age)?		x
12	Will your participants include people with learning or communication difficulties?		x
13	Will your participants include patients?		x
14	Will your participants include people in custody?		x
15	Will your participants include people engaged in illegal activities (e.g. drug taking; illegal Internet behaviour)?		x
16	Is there a realistic risk of participants experiencing either physical or psychological distress?		x

17	If yes to 16, has a proposed procedure, including the name of a contact person, been given? (see no 25)		
18	If yes to 11, is your research informed by the UCC Child Protection Policy? http://www.ucc.ie/en/ocla/policy/		

DESCRIPTION OF THE PROJECT

19. Aims of the project (briefly)

The recovery stress state indicates the extent to which persons are physically and/or mentally stressed, whether or not they are capable of using individual strategies for recovery, as well as which strategies are used. Through the simultaneous assessment of stress and recovery, a differentiated picture of the current recovery-stress state can be provided. This study aims to explore the recovery stress states of elite student-athletes.

20. Brief description and justification of methods and measures to be used (attach research questions / copy of questionnaire / interview protocol / discussion guide / etc.)

The study will be carried out by Jean-Francois Gomez.

The recovery stress state will be assessed using the Recovery-Stress Questionnaire for Athletes (RESTQ-Sport) (Kellmann 2001). This questionnaire is based on 52 items consisting of 12 non-specific and 7 sport-specific scales. The RESTQ-Sport assesses potentially stressful and restful events and their subjective consequences during the past 3 days/nights.

The participants will be asked to answer this questionnaire on their own time via an online platform (Survey Monkey). Link to the questionnaire: https://www.surveymonkey.com/r/GYXQS95). Data collection is entirely anonymous (No names, IP address, locations … will be collected).

21. Participants: recruitment methods, number, age, gender, exclusion/inclusion criteria, detail permissions

400 adult male and female subjects will be recruited by contacting various UCC sport team managers then each team will be met individually.

The participants will have to be of a minimum of 18 years old in order to be part of this study the participants and:

- Currently competing at national and/or international level
- Currently studying at the University College Cork

22. Concise statement of ethical issues raised by the project and how you intend to deal with them

There are no ethical issues anticipated with this project

23. Arrangements for informing participants about the nature of the study (cf. Question 3)

The study will be carried out by Jean-Francois Gomez (School of Education, UCC). Each team will be met individually and informed about the aim of the study. Subjects will be given written details of the study, verbally informed over the requirements and given to opportunity to ask any questions.

24. How you will obtain Informed Consent - cf. Question 4 (attach relevant form[s])

Subjects are free to take part or not in the questionnaire and free to stop partaking in the questionnaire at any points. Once the questionnaire is submitted it is no longer possible to withdraw from the study. A note at the start of the questionnaire informs the participant that: "*If you answer and submit this questionnaire, you are giving your informed consent. This questionnaire is completely anonymous. You may withdraw from this questionnaire at any time."*

25. Outline of debriefing process (cf. Question 9). If you answered YES to Question 16, give details here. State what you will advise participants to do if they should experience problems (e.g. who to contact for help).

There is no anticipated physical and psychological distress from this study. Results will be displayed in the Mardyke Arena Elite Gym for interested athletes to see.

Jean Francois Gomez will also be available to discuss the results with any subject as required.

26. Estimated start date and duration of project

Start date: 15th November 2015

Duration: 52 weeks

Signed Jean Francois Gomez Date 05/11/15

Applicant

Signed Dr. John Bradley Date 05/11/15

Research Supervisor/Principal Investigator (if applicable)

Notes

1. Please submit this form and any attachments to srec@ucc.ie (including **a scanned signed copy**). No hard copies are required.

2. Research proposals can receive only provisional approval from SREC in the absence of approval from any agency where you intend to recruit participants. If you have already secured the relevant consent, please enclose a copy with this form.

3. SREC is not primarily concerned with methodological issues but may comment on such issues in so far as they have ethical implications.

This form is adapted from pp. 13-14 of Guidelines for Minimum Standards of Ethical Approval in Psychological Research (British Psychological Society, July, 2004)

Last update: September 2015

INFORMATION SHEET

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Purpose of the Study. As part of the requirements for Phd at UCC, I have to carry out a research study. The study is looking at the impact of stress on recovery of a University College Cork student-athlete.

What will the study involve? The study will involve you to answer a questionnaire (52 questions) once. The estimated duration to complete the questionnaire is 3 to 4 minutes

Why have you been asked to take part? You have been asked because you are competing to national and/or national level in your chosen sport and are studying in a third level institution.

Do you have to take part? Participation is completely voluntary and you are free to withdraw at any point if you wish**.** If you answer and submit the questionnaire you are giving your informed consent.

Will your participation in the study be kept confidential? Yes. No clues to your identity appear in any reports or publications following this study. Any data collection is strictly anonymous.

What will happen to the information which you give?

The data will be kept confidential for the duration of the study and stored on an encrypted hard drive. On completion of the thesis, they will be retained for a further seven years and then destroyed.

What will happen to the results? The results from all the subjects will be collated and analyzed. They will be seen by my supervisor, a second marker and the external examiner. The thesis may be read by future students on the course. The study may be published in a research journal.

What are the possible disadvantages of taking part? I don't envisage any negative consequences for you in taking part.

What if there is a problem? If you have a problem at any point you should speak to one of the investigators who will advise as appropriate.

Who has reviewed this study? Approval must be given by the Social Research Ethics Committee of UCC before studies like this can take place.

Any further queries? If you need any further information, you can contact me: Jeff Gomez (Email: J.gomez@ucc.ie)

If you agree to take part in the study, please sign the consent form overleaf.

CONSENT FORM



I……agree to participate in Jean-Francois Gomez's research study.

The purpose and nature of the study has been explained to me in writing.

I am participating voluntarily.

I understand that I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating.

I understand that anonymity will be ensured in the write-up by disguising my identity.

Signed: ……. Date: ……..

PRINT NAME: …….