The Psychology of Musculoskeletal Injury in Elite and Sub-Elite Gaelic Footballers

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Abstract

Background: Gaelic football participation is associated with an inherent risk of musculoskeletal injury eliciting physical and psychological consequences. However, there is a current dearth of awareness of the psychology of injury in adolescent and adult Gaelic footballers.

Aim: This research aimed to (i) examine the epidemiology of and psychological response to musculoskeletal injury in male adolescent Gaelic footballers and its association with load, (ii) identify the perceived barriers and facilitators to mental health help-seeking in elite and sub-elite Gaelic footballers post-injury and (iii) design and implement a novel mental health literacy (MHL) educational intervention programme in Gaelic footballers.

Methods: Injuries, defined as any injury sustained during training or competition causing restricted performance or time loss from play, were assessed and recorded weekly. Written training diaries examined weekly exposure and the duration and intensity of each activity. Fear-avoidance and psychological readiness to return to play were quantitatively examined in adolescent Gaelic footballers who sustained an injury. Qualitative focus groups identified the barriers and facilitators to help-seeking in elite and sub-elite adult Gaelic footballers. A novel MHL educational intervention programme was designed and implemented in Gaelic footballers.

Results: One fifth of male adolescents experienced an injury during the season with acute, lower extremity injuries most common. Weekly load, monotony and absolute change in load were significant injury risk factors. Fear-avoidance was evident post-injury and was higher in those with greater pain scores. Education, attitudes to help-seeking, the attitudes and actions of others and accessibility were identified as key barriers and facilitators in elite and sub-elite Gaelic footballers. A MHL educational intervention programme effectively reduced stigma, improved attitudes to help-seeking and increased recognition and knowledge of mental health issues.

Conclusion: Effective injury prevention, recognition of the importance of psychological rehabilitation and successful monitoring and open communication in reducing applied loads are necessary to reduce the risks and effects of injury in male adolescent Gaelic footballers. Given the potential mental health issues that can accompany injury, rehabilitation of injured athletes must consider the facilitation and encouragement of help-seeking among players. Educational MHL interventions may be effective for facilitating mental health help-seeking post-injury.

Declaration

I hereby declare that this research is entirely the result of my own investigation and that appropriate credit has been given where reference has been made to the work of others. This work has not been submitted for any academic award, or part thereof, at this or any other educational establishment.

Signed: **Date:**

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List of Abbreviations

95% CI	95% Confidence Interval
α	Alpha
ACL	Anterior Cruciate Ligament
ACWR	Acute: Chronic Workload Ratio
AFAQ	Athlete Fear-Avoidance Questionnaire
A-Lit	Anxiety Literacy
ANOVA	Analysis of Variance
ATSPPH	Attitudes Towards Seeking Professional Psychological Help
AU	Arbitrary Units
β	Beta
BMI	Body Mass Index
BRUMS	Brunel Mood Scale
CBT	Cognitive Behavioural Therapy
d	Cohen's d effect size
D-Lit	Depression Literacy
DSM	Diagnostic and Statistical Manual of Mental Disorders
FABQ	Fear-Avoidance Beliefs Questionnaire
FAM	Fear-Avoidance Model
F-E	Elite Female
FPQ	Fear of Pain Questionnaire
F-SE	Sub-Elite Female
GAA	Gaelic Athletic Association
GFIP	Gaelic Football Injury Psychology
GP	General Practitioner
GPA	Gaelic Players Association
GPS	Global Positioning System
HBM	Health Belief Model
HSE	Health Service Executive
IASMHS	Inventory of Attitudes Toward Seeking Mental Health Services
ICC	Intra-Class Correlation
ICD	International Statistical Classification of Diseases
IP	Incidence Proportion
IPRRS	Injury Psychological Readiness to Return to Sport

IR	Incidence Rate
κ	Kappa
LGFA	Ladies Gaelic Football Association
Ln	Natural logarithm
M	Mean
mAFAQ	Modified Athlete Fear-Avoidance Questionnaire
MAKS	Mental Health Knowledge Schedule
M-E	Elite Male
MHFA	Mental Health First Aid
MHL	Mental Health Literacy
MHLS	Mental Health Literacy Scale
MMHLM	Multicomponent Mental Health Literacy Measure
M-SE	Sub-Elite Male
N	Number of participants
NR	Not Reported
η^2	Eta squared
OR	Odds Ratio
P	Significance
PCS	Pain Catastrophizing Scale
POMS	Profile of Mood States
r	Correlation value
RIP	Repeat Incidence Proportion
RPE	Rating of Perceived Exertion
RR	Risk Ratio
SCFE	Slipped Capital Femoral Epiphysis
SD	Standard Deviation
SDT	Self-Determination Theory
SOMI	State of Mind Ireland
sRPE	Session Rating of Perceived Exertion
SRQR	Standards for Reporting Qualitative Research
SSCI	State Sport Confidence Inventory
SSOSH	Self-Stigma of Seeking Help
SSRPH	Stigma Scale for Receiving Psychological Help
TPB	Theory of Planned Behaviour

TRA	Theory of Reasoned Action
TSCI	Trait Sport Confidence Inventory
TSK	Tampa Scale for Kinesiophobia
TRIPP	Translating Research into Injury Prevention Practice
US	United States
VAS	Visual Analogue Scale
VIF	Variance Inflation Factor
WGPA	Women's Gaelic Players Association

Glossary of Terms

Athlete exposure – participation in scheduled team practices or games during the course of the season.

Barriers – internal or external factors that limit the likelihood of seeking help for psychological distress.

Burnout – a psychological syndrome encompassing emotional and physical exhaustion, reduced athletic accomplishment and sport devaluation.

Emotional competence – the process of identifying, describing and understanding emotions and the ability to manage these emotions effectively.

Facilitators – factors that can make it easier for you to seek help.

Fatigue – the failure to maintain the required or expected force or power output.

Fear-avoidance – the avoidance of movements or activities based on fear, is a psychological reaction to injury that can influence the experience of pain.

Growth-related issue – injuries that occurred specifically to the growing skeleton due to the susceptibility of growth cartilage to injury from repetitive loading and the increased risk for injury associated with the adolescent growth spurt.

Help-seeking – an adaptive coping process that is the attempt to obtain external assistance to deal with a mental health concern.

Incidence proportion – average risk of injury per athlete.

Incidence rate – incidence of injury per unit of athlete time, expressed per 1000 total exposure hours, 1000 training hours and 1000 match hours.

Injuries – any injury sustained during training or competition causing restricted performance or time loss from play.

Kinesiophobia – an excessive, irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or re-injury.

Load – the cumulative amount of stress placed on an individual from multiple sessions over a period of time, external workloads performed or the internal response to that workload.

Mental health – a state of well-being, where each individual realises their own potential, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to their own community.

Mental health literacy – an individual's knowledge and beliefs about mental health that aid their recognition, management or prevention.

Mental toughness – a natural or developed psychological mind-set that allows greater coping with the demands of sports participation and a determination to remain focused, confident and in control in highly-pressurised situations.

Overtraining – a psychological syndrome encompassing emotional and physical exhaustion, reduced athletic accomplishment and sport devaluation.

Pain catastrophizing – the cognitive element of the fear network where the anxious athlete focuses on the most extreme negative consequences conceivable with pain interpreted as being extremely threatening.

Repeat incidence proportion – average risk of sustaining a repeat injury per athlete.

Sports specialisation – intense year-round training in a single sport at the exclusion of other sports.

Stigma –the belief that an individual will be negatively judged for seeking help by those from whom they seek help, others who are aware they are seeking help or both.

Self-stigma – negative attitudes and self-perceptions as a result of internalised societal ideas of stigma.

Social support – the number and quality of individuals on whom a person can depend on during periods of stress.

Dissemination of Research

The work of this research has been disseminated to date through peer-reviewed publications, via oral and poster presentations at national and international conferences and additional media dissemination opportunities.

PUBLICATIONS

PEER REVIEWED PUBLICATIONS (Appendix A)

O'Keeffe, S., Ní Chéilleachair, N., Campbell, M., O'Connor, S. (2021). Barriers and Facilitators to Mental Health Help-Seeking in Elite Gaelic Footballers Post-Injury: A Qualitative Study. *Research Quarterly for Sport and Exercise.* Ahead of print. DOI: 10.1080/02701367.2020.1865517

O'Keeffe, S., Ní Chéilleachair, N., O'Connor, S. (2020). Fear-Avoidance Following Musculoskeletal Injury in Male Adolescent Gaelic Footballers. *Journal of Sport Rehabilitation.* 29(4), pp.413-419. DOI: 10.1123/jsr.2018-0258

O'Keeffe, S., O'Connor, S., Ní Chéilleachair, N. (2020). Are Internal Training Load Measures Associated with Injuries in Male Adolescent Gaelic Football Players? *European Journal of Sport Science.* 20(2), pp.249-260. DOI: 10.1080/17461391.2019.1621950

PEER REVIEWED PUBLICATIONS UNDER-REVIEW

O'Keeffe, S., O'Connor, S., Campbell, M., Ní Chéilleachair, N. (2021). A Qualitative Examination of the Barriers and Facilitators to Professional Mental Health Help-Seeking Following Injury in Sub-Elite Gaelic Footballers.

CONFERENCE ORAL PRESENTATIONS

O'Keeffe, S., O'Connor, S., Campbell, M., Ní Chéilleachair N. (2020). Mental Health and Injury Psychology in Elite and Sub-Elite Gaelic Footballers. Postgraduate Research Connect Seminar Series organised by School of Sport and Exercise Science at University of Lincoln. (4th August 2020).

O'Keeffe, S., Ní Chéilleachair N., O'Connor, S. (2019). The Identification of Perceived Barriers and Facilitators to Mental Health Help-Seeking in Elite and Recreational Gaelic Footballers Post-Injury. All Ireland Postgraduate Conference in Sport Science, Physical Activity and Physical Education, Athlone Institute of Technology, Ireland. (10th May 2019).

O'Keeffe, S., O'Connor, S., Ní Chéilleachair N. (2018). Fear-Avoidance as a Psychological Reaction to Musculoskeletal Injury in Male Adolescent Gaelic Footballers. European College of Sport Science Congress, Dublin, Ireland. (4th to 7th July 2018).

O'Keeffe, S., Ní Chéilleachair N., O'Connor, S. (2018). The Psychology of Musculoskeletal Injury. Department of Sport & Health Sciences Research Seminar, Athlone Institute of Technology, Athlone, Ireland. (1st May 2018).

O'Keeffe, S., Ní Chéilleachair N., O'Connor, S. (2018). Epidemiology of Musculoskeletal Injury in Male Adolescent Gaelic Footballers over One Season. Faculty of Sport and Exercise Medicine Spring Study Day, UL, Limerick, Ireland. (23rd March 2018).

O'Keeffe, S., O'Connor, S., Ní Chéilleachair N. (2017). The Psychological Effect of Musculoskeletal Injury on Male Adolescent Gaelic Footballers. Faculty of Sport and Exercise Medicine Spring Study Day, UCD, Dublin, Ireland. (24th March 2017).

CONFERENCE POSTER PRESENTATIONS

O'Keeffe, S., O'Connor, S., Campbell, M., Ní Chéilleachair N. (2020). The Development and Pilot Testing of an Educational Mental Health Intervention for Gaelic Footballers. AIT Showcase Postgraduate Research Poster Event, Athlone Institute of Technology, Ireland. (19th June 2020).

O'Keeffe, S., O'Connor, S., Campbell, M., Ní Chéilleachair N. (2019). Perceived Barriers and Facilitators to Mental Health Help Seeking in Recreational Gaelic Footballers Post Injury. AIT Postgraduate Research Day, Athlone Institute of Technology, Athlone, Ireland. (22nd November 2019).

O'Keeffe, S., O'Connor, S., Campbell, M., Ní Chéilleachair N. (2019). Perceived Barriers and Facilitators to Mental Health Help Seeking in Recreational Gaelic Footballers Post Injury. Faculty of Sport and Exercise Medicine Annual Scientific Conference, Royal College of Surgeons, Dublin, Ireland. (14th September 2019).

O'Keeffe, S., Ní Chéilleachair N., O'Connor, S. (2019). The Identification of Perceived Barriers and Facilitators to Mental Health Help-Seeking in Elite and Recreational Gaelic Footballers Post-Injury. AIT Research Seminar, Athlone Institute of Technology, Athlone, Ireland. (2nd May 2019).

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O'Keeffe, S., O'Connor, S., Ní Chéilleachair N. (2017). Epidemiology of Musculoskeletal Injury in Male Adolescent Gaelic Footballers over One Season. Ethics in Sport Seminar, Athlone Institute of Technology. (11th May 2017).

O'Keeffe, S., O'Connor, S., Ní Chéilleachair N. (2017). Epidemiology of Musculoskeletal Injury in Male Adolescent Gaelic Footballers over One Season. All-Ireland Postgraduate Conference, Institute of Technology Carlow, Ireland. (21st April 2017).

MEDIA

O'Keeffe, S., O'Connor, S., Campbell, M., Ní Chéilleachair N. (2020). Mental Health Help-Seeking Following Injury in Female Gaelic Footballers. Ladies Gaelic Football Association Research Pod. (5th January 2021). Available at: https://www.youtube.com/watch?v=KHiQZJUQOA0&feature=youtu.be

Chapter 1. Introduction

1.1 Background and Rationale

Gaelic football is a national sport in Ireland governed by the Gaelic Athletic Association (GAA) and Ladies Gaelic Football Association (LGFA). In excess of 370,000 male and 200,000 female players are registered with over 2,200 and 1,000 clubs respectively (O'Connor et al., 2020; Mangan and Collins, 2016; Gaelic Athletic Association, 2016; Ladies Gaelic Football Association, 2011). Gaelic football is regarded as one of the most popular team-sports played by Irish adults (Ipsos MRBI, 2017). The GAA also plays an important role in the physical activity practices of Irish youth, where Gaelic football is regarded as the most popular club sport with 37.7% of adolescent males participating (Murphy et al., 2017) and over 100,000 registered members of the GAA aged from 13 to 18 years (Gaelic Athletic Association, 2015).

Gaelic football is described as a high-intensity, high-velocity contact game that requires large volumes of strength, endurance, flexibility and speed (McIntyre, 2005). Key elements of the game are sprinting, change of direction, jumping, catching, landing, kicking, passing and scoring along with the high levels of physical contact. The primary aim of the game is to outscore the opposing team by scoring more points (when the ball goes over the crossbar of the goals) or goals (when the ball goes below the crossbar into the net) (Murphy et al., 2012). A game of Gaelic football consists of two teams of fifteen players with each team made up of a goalkeeper, six defenders, two midfielders and six attacking forwards (Wilson et al., 2007). Participation in Gaelic football occurs at elite and sub-elite levels. For the purpose of this research, elite Gaelic footballers are defined as those players competing at national level with their representative inter-county team (Mangan et al., 2017). Sub-elite Gaelic footballers are defined as players competing recreationally at club level (Mangan et al., 2017). Games at adolescent and sub-elite adult levels are 60 minutes in duration, while elite games last 70 minutes (O'Connor et al., 2016a; Wilson et al., 2007). Gaelic footballers may compete simultaneously with sub-elite (club and school/college) and elite (county) teams and at different age levels.

Gaelic football participation can be regarded as an enjoyable experience but an inherent risk of musculoskeletal injury exists when participating in sport (Roe et al., 2017; Van Mechelen et al., 1992). Injuries are common in Gaelic football with 2.4 to 17.9 injuries occurring per 1000 participation hours in adult (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; Murphy et al., 2012; Crowley et al., 2011; Wilson et al., 2007;

Newell et al., 2006) and older adolescent participants (O'Connor et al., 2016a; Watson, 1996). Injury can result in trauma, pain and loss of function (O'Connor et al., 2016a; Murphy et al., 2012), is associated with considerable medical expenses and treatment costs and can place undue pressure on accident and emergency services and hospital staff (O'Connor et al., 2016a; Murphy et al., 2012; Junge and Dvorak, 2000). The occurrence and magnitude of the effects of injuries in Gaelic football may be reduced with efficient injury prevention programmes (Meeuwisse et al., 2007), which require a clear understanding of the extent of the injury problem (Roe et al., 2017; Van Tiggelen et al., 2008; Finch, 2006; Van Mechelen et al., 1992). Epidemiological research to date has focused on injuries in elite adult Gaelic footballers (Roe et al., 2018a; Murphy et al., 2012; Newell et al., 2006; Cromwell et al., 2000). There are currently only two research studies examining the epidemiology of injury in adolescent Gaelic footballers (O'Connor et al., 2016a; Watson, 1996), one of which was conducted over 20 years ago. In addition, these studies focused on older players, with no injury epidemiological research in younger adolescent Gaelic footballers currently available. Given the popularity of the sport in youth participants, a clear and current understanding of the occurrence of injury in male adolescent Gaelic footballers is essential.

In addition, a current dearth of research examining the association between internal load and the occurrence of injury in male adolescent Gaelic footballers exists. Rapid physical, physiological and psychological pubertal changes can occur during adolescence (Gabbett et al., 2014) that may affect an athlete's response to load and subsequent risk of sustaining an injury. There is currently no available research examining internal load in adolescent Gaelic footballers. Similar to previous epidemiological research, examination of load and injury risk has focused on elite adult Gaelic footballers (Malone et al., 2017c; Malone et al., 2017d). Without the necessary awareness of the occurrence of injury and its association with load, it is difficult to design and incorporate effective injury prevention initiatives. The need for research in adolescent Gaelic games is emphasised by the prevalence of youth sport attrition, where 58.0% of players aged 12 to 21 dropout from Gaelic games (Gaelic Athletic Association, 2015). In comparison, 17.7% of Irish youths dropout from soccer, while 8.7% dropout from rugby (Murphy et al., 2017). In particular, an 11.3% dropout rate from sub-elite Gaelic football has been identified among adolescent males over a five year period (Murphy et al., 2017), with injury suggested as a reason for dropout in youths (Murphy et al., 2017; Turner and Moore, 2016; Lunn et

al., 2013). Thus, this research will aim to examine the epidemiology of injury and its association with load in male adolescent Gaelic footballers.

Injury may be perceived as a major stressor that can initiate or exacerbate symptoms of a mental health issue (Rice et al., 2016; Gulliver et al., 2015; Sarkar and Fletcher, 2014; Nixdorf et al., 2013; Ardern et al., 2013; Walker et al., 2007). Psychological responses to injury are subjective to each individual (Masten et al., 2014) and can include normal or negative reactions but concern is warranted when responses are excessive, do not resolve, worsen over time or the athlete is unable to cope (Putukian, 2016). A strong sense of athletic identity or greater emotional and mental commitment to sport participation, can elicit more negative psychological responses to injury (Weinburg et al., 2013; Brewer, 1993). However, there is a current lack of research examining the psychological response to injury among adolescent Gaelic footballers and in particular, the psychosocial factors influencing the response to injury, such as fear-avoidance. Fear-avoidance can influence the experience of pain and stimulate avoidance behaviours (Vlaeyen and Linton, 2000), which may subsequently lead to dysfunction (Dover and Amar, 2015) and delay post-injury rehabilitation. Thus, an additional aim of this research is to examine fear-avoidance as a psychological response to injury in male adolescent Gaelic footballers.

Mental health issues are prevalent in young Irish people, with 20.0% to 25.0% of those aged 15 to 34 years experiencing symptoms of a mental health issue (Ipsos MRBI, 2016). The peak onset of mental health issues is during late adolescence and early adulthood (Rice et al., 2016), which coincides with the period of peak Gaelic football participation. Research shows mental health issues are common in adult Gaelic players, with 48.0% reporting symptoms of anxiety or depression (Gouttebarge et al., 2016). In addition, elite Gaelic players with a history of severe injury are significantly more likely to experience symptoms of a mental health issue (Gouttebarge et al., 2016). However, few athletes seek professional psychological help (Gorczynski et al., 2019), with a current disparity evident between the rate of help-seeking and the prevalence of symptoms of a mental health issue (Rickwood and Thomas, 2012). It is clear there are factors deterring help-seeking, with stigma, lack of mental health literacy (MHL), poor accessibility and personal characteristics of the help-seeker previously reported as barriers to help-seeking among elite athletes from a number of sports (Gulliver et al., 2012a).

Elite Gaelic footballers may face unique demands not evident in other elite sports, due to the quasi-professional nature of the sport (Beasley, 2015) and the requirements to balance their professional and personal lives with the intense demands of elite Gaelic football participation (Kelly et al., 2018). However, the majority of Gaelic footballers play recreationally at the sub-elite level, where they may be exposed to lower levels of preparation compared to their elite counterparts (Wilson et al., 2007), with only 0.3% of sub-elite players selected to also play at the elite level (Mangan et al., 2020). Therefore, an understanding of the unique factors influencing help-seeking in Gaelic football is important and thus, an additional aim of the current research is to examine the barriers and facilitators to professional mental health help-seeking post-injury among elite and sub-elite Gaelic footballers.

The identification of factors limiting and facilitating help-seeking may not be sufficient enough to aid help-seeking among Gaelic footballers. As mental health will continue to be a major concern in athletes (Gorczynski et al., 2020a), proactive strategies to safeguard wellbeing and equip Gaelic footballers with the necessary skills and tools to manage their mental health when injured may be beneficial. Therefore, MHL educational interventions may be a useful approach to reduce perceived barriers and facilitate professional mental health help-seeking. In particular, by increasing MHL, stigma may be reduced and attitudes towards mental health issues and treatment options may be improved (Gorczynski et al., 2020a; Jung et al., 2016). MHL interventions specific to Gaelic footballers are necessary to address the identified barriers and facilitators and to ensure personal, cultural and environmental factors unique to Gaelic footballers are addressed, particularly with the unique context of the GAA and LGFA in Irish society. Online delivery of a MHL intervention to Gaelic footballers may be appropriate, with mental health outcomes shown to be positively affected by online programmes designed for a specific population (Lustria et al., 2013), while also proven as effective and acceptable (Batchelor et al., 2020; Eccles et al., 2020). Thus, the current research also aims to design and implement a novel educational MHL intervention programme in Gaelic footballers.

1.2 Aims and Objectives of the Research

The primary aim of this research is to examine injuries and the associated psychological response in Gaelic footballers.

1.2.1. Study 1 Aims and Objectives

Aim

To examine the epidemiology of musculoskeletal injury, its association with load and the psychological response to injury in male adolescent Gaelic footballers.

Objectives

- To prospectively examine musculoskeletal injury incidence and injuries per phase of the season in male adolescent Gaelic footballers.
- To detail the type, nature, location, severity, mechanism and time of musculoskeletal injury in male adolescent Gaelic footballers.
- To establish the relationship between volume of sports played and injury in male adolescent Gaelic footballers.
- To investigate the association between internal load and injury in male adolescent Gaelic footballers.
- To examine the psychometric properties of the modified Athlete Fear-Avoidance Questionnaire.
- To investigate fear-avoidance as a psychological response to injury in male adolescent Gaelic footballers post-injury and prior to return to play.
- To investigate psychological readiness to return to play following a time-loss injury in male adolescent Gaelic footballers.

1.2.2. Study 2 Aims and Objectives

Aim

To examine the perceived barriers and facilitators to mental health help-seeking following injury among male and female elite and sub-elite Gaelic footballers.

Objectives

- To examine the perceived barriers and facilitators to mental health help-seeking among elite Gaelic footballers.
- To identify key differences in perceived barriers and facilitators to mental health help-seeking between elite male and female Gaelic footballers.
- To examine the perceived barriers and facilitators to mental health help-seeking among sub-elite Gaelic footballers.
- To identify key differences in perceived barriers and facilitators to mental health help-seeking between sub-elite male and female Gaelic footballers.

1.2.3. Study 3 Aims and Objectives

Aim

To design and implement a novel educational MHL intervention programme in Gaelic footballers.

Objectives

- To design a novel educational MHL intervention programme specific to Gaelic footballers.
- To implement and assess the effectiveness of the novel 'GAA Mental Health – Injury and a Healthy Mind' educational intervention programme on stigma, attitudes to help-seeking and recognition and knowledge of mental health issues.

1.3 Structure of the Thesis

The current research was conducted over three main studies and the thesis is accordingly organised into eight chapters. The current chapter (**Chapter 1**) provides an introduction to the research and outlines the key aims and objectives of the three studies conducted. **Chapter 2** provides a comprehensive narrative literature review and details the epidemiology of injury in Gaelic football, special injury considerations and load monitoring in adolescent athletes, mental health and the psychological response to injury, mental health help-seeking and MHL interventions.

Study 1 is detailed in Chapters 3 to 5. **Chapter 3** outlines the epidemiology of injury in male adolescent Gaelic footballers. The findings indicate injuries are prevalent in male adolescent Gaelic footballers, with match injuries significantly more common than training injuries. New, acute injuries to the hamstring, ankle and hand and fingers were prevalent and sprinting was the most commonly noted injury mechanism. **Chapter 4**, which has been published in the European Journal of Sport Science, examined the association between internal load and injury in male adolescent Gaelic footballers. Excessive weekly load, monotony or absolute load changes increased the risk of sustaining an injury during the season, with internal load significantly associated with injury. **Chapter 5**, published in the Journal of Sport Rehabilitation, examines fear-avoidance as a psychological response to injury. The findings indicate fear-avoidance is evident in male adolescent Gaelic footballers post-injury, with the levels experienced similar to levels previously identified in collegiate and adult athletes. Fear-avoidance was

also shown to be moderated by pain, while fear-avoidance decreased prior to return to play.

Study 2 is detailed in **Chapter 6**, which identifies the barriers and facilitators to professional mental health help-seeking post-injury in male and female elite and sub-elite Gaelic footballers. The findings from the elite Gaelic football participants in Chapter 6 are published in the Research Quarterly for Exercise and Sport journal, with the findings from the sub-elite participants currently under review in the Journal of Applied Sport Psychology. Overall, study 2 identified education, the attitudes, actions and opinions of others, attitudes to help-seeking and accessibility as perceived barriers and facilitators among elite and sub-elite Gaelic footballers influencing professional mental health help-seeking following injury. The findings highlight the need for appropriate interventions to facilitate help-seeking and aid the safeguarding of players mental health.

Chapter 7 presents the findings of the final study of the current research, which involved the design and delivery of a novel MHL educational intervention programme for Gaelic footballers. The results indicate the effectiveness of the programme, which is specific to Gaelic footballers, at reducing stigma, improving attitudes to help-seeking and increasing mental health knowledge and the recognition of mental health issues. In conclusion, **Chapter 8** provides a comprehensive summary of the current research, while also accounting for the limitations and directions for future research.

Chapter 2. Literature Review

2.1 Introduction to Literature Review

The objective of this literature review is to critically analyse current literature pertaining to the occurrence of musculoskeletal injury in Gaelic football and the psychological response to these injuries. Identifying the extent of the injury problem through epidemiological research is an essential step for initiating injury prevention measures and reducing the burden of injury. Thus, this literature review will focus on injury epidemiology in Gaelic football, special injury considerations and load monitoring in young athletes. In addition, Gaelic football participation not only presents a risk of injury but the occurrence of injury can initiate or exacerbate mental ill-health. Therefore, an examination of the proposed models outlining the psychological response to musculoskeletal injury will be presented, along with the current methods utilised in examining negative psychological responses to injury. Help-seeking among Gaelic footballers experiencing mental health issues following musculoskeletal injury will also be analysed by identifying the barriers and facilitators to mental health help-seeking identified in athletes to date. Help-seeking post-injury may be facilitated with effective interventions and a thorough examination of previous MHL interventions will be examined.

2.2 Epidemiology of Injury

Injury prevention through proactive approaches addressing causative factors is an ideal method of circumventing the adverse effects of injury and encouraging continued participation in physical activity and sport (Van Tiggelen et al., 2008). A number of injury prevention models have been proposed in research to date, initiated by the four-step 'sequence of prevention' model (Van Mechelen et al., 1992). The model (Table 2.1) highlights a systematic process aimed at identifying and describing the injury problem and highlighting the risk factors and mechanisms of injury. A targeted prevention programme is introduced and evaluated to determine the success of the preventative strategy by repeating step one. Finch (2006) proposed a new model, the Translating Research into Injury Prevention Practice framework (TRIPP), designed to examine the implementation of prevention programmes and their 'real-life' applicability (Finch, 2006). TRIPP (Table 2.1) ensures a thorough understanding of the aetiology of injury and the development of preventive measures, accounting for correct scientific evaluation and the context in which the interventions will be implemented. The final stage involves

evaluation of the effectiveness of the implemented injury prevention programme. Van Tiggelen et al. (2008) added an additional essential step to the TRIPP framework by identifying risk-taking behaviour and compliance of the athlete as limiting factors in the prevention of sports injuries (Table 2.1). Successful injury prevention is dependent upon the compliance of the athlete and this model highlights that research efforts must include clear information on the efficacy and efficiency of such measures, in terms of the financial, practical and administrative effectiveness, before it can be considered by the stakeholders (Van Tiggelen et al. 2008). Injury prevention measures that change the nature or appeal of the sport or negatively affect performance will meet strong resistance against their use (Finch, 2006). Thus, regression between stages is accounted for in the model so when efficacy, efficiency or compliance and risk-taking behaviours are insufficient, stage 3 is repeated to propose a preventive measure (Table 2.1).

However, the applicability of these generalised models by Van Mechelen et al. (1992), Finch (2006) and Van Tiggelen et al. (2008) to athletes on an individual basis should be questioned. One player may present with different intrinsic risk factors for injury than a teammate (e.g. age, previous injury, body composition, neuromuscular control etc.) (Meeuwisse et al., 2007), indicating a generalised warm-up or pre-season prevention programme may not reduce the incidence of injury until individual differences are addressed. An alternative approach, the six-stage operational framework for individualising injury risk management (Table 2.1), aims to guide practitioners in implementing an evidence-based approach to injury risk management (Roe et al., 2017). Stages 1 and 2 examine injury trends and risk factors, focusing on when, where, how and why injuries occur. Stage 3 examines the demands of the sport, while stage 4 profiles the capacity of the athlete to withstand those demands. Stage 5 focuses on management of the individual athlete and the interventions necessary to address injury risk factors and prepare for the specific demands of the sport. How an athlete responds to the intervention over time is assessed in stage 6 (Roe et al., 2017).

The injury risk and prevention models developed by Roe et al. (2017), Van Tiggelen et al. (2008), Finch (2006) and Van Mechelen et al. (1992) consistently show the first stage of injury prevention is the identification of the extent of the injury problem. Thus, epidemiological studies are necessary and must be derived from well organised methodologies, with the importance of yielding quality information reflecting the true

risk of physical activity and sport. Caine et al. (2006) identified the descriptive data and the factors surrounding injury occurrence that need to be considered when carrying out epidemiological research (Figure 2.1).

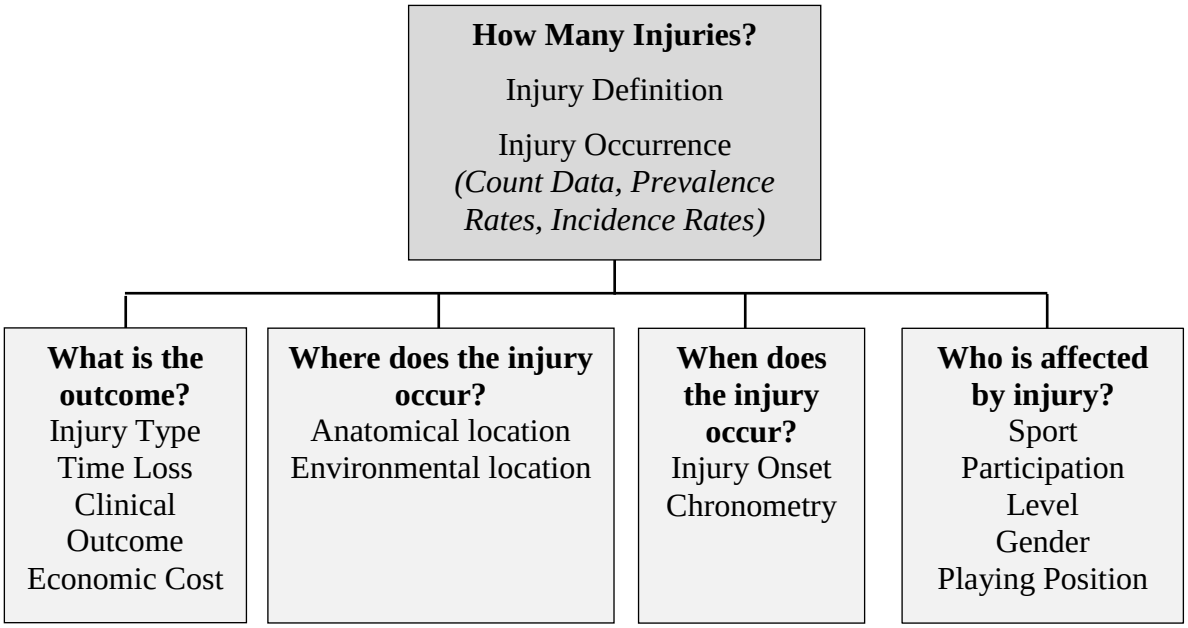

Figure 2.1 Descriptive epidemiology of sports-related injuries (Caine et al., 2006)

Table 2.1 Injury prevention models

Stage	Sequence of Prevention (Van Mechelen et al., 1992)	TRIPP Framework (Finch, 2006)	Modified Sequence of Prevention (Van Tiggelen et al., 2008)	Operational Framework (Roe et al. 2017)
1	Establish extent of the problem	Injury surveillance	Establishing the extent of the injury problem	Injury trends
2	Establish aetiology and mechanisms of injury	Establish aetiology and mechanisms of injury	Establishing the aetiology and mechanisms of the injury	Risk factors
3	Introduce preventive measures	Develop preventive measures	Proposing a preventive measure	Sport demands
4	Assess their effectiveness by repeating stage 1	'Ideal conditions'/scientific evaluation	Establishing the efficacy of a preventive measure	Athlete profile
5		Describe intervention context to inform implementation strategies	Establishing the efficiency of a preventive measure	Athlete management
6		Evaluate effectiveness of preventive measures in implementation context	Assessing the compliance and risk-taking behaviour for a preventive measure	Athlete monitoring
7			Assess assumed effectiveness of prevention by repeating step 1	

Note: TRIPP=Translating Research into Injury Prevention Practice

2.2.1. Injury Occurrence

In the identification of the extent of the injury problem, injury occurrence must primarily be examined. The prevalence of injury has been examined in Gaelic football to date through hospital-based and Gaelic football team-based epidemiological research.

2.2.1.1. Hospital-Based Epidemiological Research

Previous research has examined sport and recreational injuries presenting to emergency departments and outpatient orthopaedic centres (Table 2.2). Injuries sustained in Gaelic football account for 9.8% to 24.0% of all youth injuries presenting to emergency departments (O'Rourke et al., 2007; O'Rourke et al., 2005) (Table 2.2). A breakdown of Gaelic football injuries specifically in adults presenting to emergency departments is not currently available but 30.0% of sports and recreation-related injuries occurred in Gaelic football in adult and youth attendees (Falvey et al., 2009) (Table 2.2). A significantly greater proportion of injuries in youths were recorded in males (N=340) compared to females (N=137) ($P<0.05$) (O'Toole et al., 2008). The average age of youth patients presenting to Irish emergency departments with sports-related injuries is 8.9 to 11.7 years (O'Toole et al., 2008; O'Rourke et al., 2005), which is similar to the average age of 12.2 to 13.0 years seen in the United States (U.S.) (Damore et al., 2003; Taylor and Attia, 2000). However, a greater number of sports-related injuries present to Irish emergency departments over 6-months (N=1143) (O'Rourke et al., 2005), compared to those seen over 1-year in the U.S. (N=871) (Monroe et al., 2011). Greater direct provision of healthcare services, where 70.0% of U.S. high schools have an athletic therapists on site in the school (Pryor et al., 2015), may explain the difference in injuries evident. In Ireland, similar direct contact at the time of injury is rare as the provision of pitch-side healthcare from sports medicine clinicians for underage teams is relatively uncommon at present.

Hospital-based research solely provides a 'tip of the iceberg' representation of the sports injury problem, as not all injuries require attendance at the emergency department and many acute and less severe injuries may go unrecorded. There are also an increased number of local injury units outside of the emergency department, which treat non-life threatening injuries, such as those occurring with sports participation. Therefore, hospital-based research alone may result in under-reporting of the overall injury rate. Instead, the examination of injuries sustained during Gaelic football must include those presenting at hospital emergency departments as well as those who seek medical attention from a sports

medicine clinician, including an athletic therapist, physiotherapist or general practitioner (GP).

2.2.1.2. Gaelic Football Epidemiological Research

There is a multitude of research currently available examining the epidemiology of injury in elite and sub-elite adult male and female Gaelic footballers, with 2.4 to 17.9 injuries evident per 1000 hours of Gaelic football participation (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; Murphy et al., 2012; Crowley et al., 2011; Wilson et al., 2007; Newell et al., 2006) (Table 2.3). However, there is a dearth of research on adolescent participants, with only two available studies and a recorded incidence of 4.9 to 7.1 injuries per 1000 hours (O'Connor et al., 2016a; Watson, 1996) (Table 2.4). Accurate reporting of the incidence and description of injury allows for the development, implementation and assessment of injury prevention programmes (Brooks and Fuller, 2006). However, differences in data collection methods and injury definitions are evident in current Gaelic football epidemiological research (Table 2.3; Table 2.4), which restricts inter-study data comparison and efficient implementation of prevention strategies.

Table 2.2 Hospital-based epidemiological research

Study	Research Design	Duration and Location of Injury Surveillance	Inclusion Criteria	Participants	Conclusions
Falvey et al. (2009)	Prospective Questionnaire	6 months Emergency department of Cork University Hospital	All persons (adults and youths) attending the emergency department for treatment of a physical injury, which the patient identified as resulting from a recreational or sporting activity	22,465 attendances at the emergency department (aged over 4 years)	14.1% of hospital attendances were sports and recreation-related injuries (N=3172), of which 9.6% were in adults and 4.8% were in youths under 16 years 30.0% of sports and recreation-related injuries occurred in Gaelic football
O'Toole et al. (2008)	Prospective Questionnaire	4 months Paediatric out-patient departments of Our Lady's Children's Hospital, Crumlin, Dublin and National Children's Hospital, Tallaght, Dublin	Any injury presenting to two major paediatric orthopaedic outpatient departments were classified under 6 headings; sports, recreational, falls, direct trauma, motorised vehicles/road-traffic accidents and miscellaneous	1791 Male N=1087 Female N=704 8.9 years (range: 9 months to 16 years)	27.0% and 28.0% of all injuries were sporting and recreational injuries respectively GAA injuries- 32.0% of all sporting injuries
O'Rourke et al. (2007)	Retrospective Review of medical charts	6 months Emergency department of Cork University Hospital	Injuries sustained by children under 17 years of age during participation in soccer, Gaelic football or rugby	23,000 charts reviewed	409 sports-related injuries Soccer- 56.0% of all injuries Gaelic football- 24.0% of all injuries Rugby- 20.0% of all injuries

O'Rourke et al. (2005)	Retrospective Review of medical charts	6 months Emergency department of Cork University Hospital	Injuries sustained by children under 17 years of age	4390 paediatric patients Male N=777 (10.4 years) Females N=366 (11.7 years)	1143 sports-related injuries Soccer- 23.0% of all injuries Hurling/camogie- 10.8% of all injuries Gaelic football- 9.8% of all injuries Rugby- 7.0% of all injuries
Abernethy and MacAuley (2003)	Prospective Interview	3 weeks Accident and Emergency Department of The Ulster Hospital	Injuries occurring during school games, PE classes and competitive school matches occurring both on weekdays and at weekends	194 children 11 to 18 years	School sports injury accounted for 51.0% of injuries

Note: N=number of participants

Table 2.3 Epidemiology of injury in male and female adult Gaelic football

Study	Research Design	Participants	Injury Definition	Injury Rate		
				Overall	Match	Training
O'Connor et al. (2020)	Prospective Medical assessment 2 consecutive seasons	75 collegiate female Gaelic footballers	Any injury that prevents a player from taking a full part in all training and match play activities typically planned for that day, where the injury has been there for a period >24 hours from midnight at the end of the day that the injury was sustained	17.9 injuries per 1000h	42.5 injuries per 1000h	7.9 injuries per 1000h
Roe et al. (2018a)	Prospective Medical assessment 8 consecutive seasons	17 elite male Gaelic football teams	Any injury that prevents a player from taking a full part in all training and match play activities typically planned for that day, where the injury has been there for a period greater than 24 hours from midnight at the end of the day that the injury was sustained	9.0 injuries per 1000h	49.8 injuries per 1000h	3.9 injuries per 1000h
O'Connor et al. (2017)	Prospective Medical assessment 1 season	217 collegiate male Gaelic footballers (19.3 ± 1.9 years)	Any injury sustained during training or competition resulting in time lost from play or athlete reported restricted performance	12.6 injuries per 1000h	25.1 injuries per 1000h	7.3 injuries per 1000h
Murphy et al. (2012)	Prospective Medical assessment 4 consecutive seasons	851 senior elite male Gaelic footballers 24.9 years (range 18-36 years)	Injury that prevents a player from taking a full part in all training and match play activities typically planned for that day, where the injury has been there for a period greater than 24 hours from midnight at the end of the day that the injury was sustained	9.5 injuries per 1000h	61.9 injuries per 1000h	4.1 injuries per 1000h
Crowley et al. (2011)	Retrospective Review of all insurance claims 1 season	County Cork male and female Gaelic football clubs	Injury that requires completion of an insurance claim through the GAA Players Injury Scheme signed by the team physician	Males - 8.3 injuries per 1000h	NR	NR

				Females – 2.4 injuries per 1000h		
Wilson et al. (2007)	Prospective Telephone interviews 6 months	83 senior club male Gaelic footballers (aged >18 years)	Injury that caused a player to miss one training or match or that required at least one treatment	13.5 injuries per 1000h	51.2 injuries per 1000h	5.8 injuries per 1000h
Newell et al. (2006)	Prospective Medical assessment 1 season	511 elite male Gaelic footballers (18 to 36 years)	Injury that made a player unable to participate fully in training or games for a period of at least 48 hours after the injury was sustained	11.8 injuries per 1000h	64.0 injuries per 1000h	5.5 injuries per 1000h
Cromwell et al. (2000)	Retrospective Questionnaire 6 months	107 elite male Gaelic footballers (24.4 ± 3.5 years)	Injury sustained during training or competition resulting in restricted performance or time loss from play	1.8 injuries per player per year	NR	NR

Note: NR=not reported; per 1000h=per 1000 participation hours; U.S.=United States.

Table 2.4 Epidemiology of injury in male adolescent Gaelic football

Study	Research Design	Participants	Injury Definition	Injury Rate		
				Overall	Match	Training
O'Connor et al. (2016a)	Prospective Medical assessment 1 year	292 adolescent Gaelic footballers and hurlers Gaelic footballers N=137 Hurlers N=99 Both N=56 (15.7 ± 0.8 years)	Any injury sustained during training or competition resulting in restricted performance or time loss from play	4.9 injuries per 1000h	9.3 injuries per 1000h	3.0 injuries per 1000h
Watson (1996)	Prospective Questionnaire 7 months	150 male members of 9 senior school football squads (16.9 ± 0.8 years)	Any injury sustained by the subject during training for, or participation in, the game of Gaelic football	71.0 injuries per 10,000h	176.0 injuries per 10,000h	31.1 injuries per 10,000h

Note: N=number of participants; per 1000h=per 1000 participation hours; per 10,000h=per 10,000 participation hours.

2.2.1.2.1. Data Collection Methods

Gaelic football epidemiological research to date has utilised prospective (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; O'Connor et al., 2016a; Murphy et al., 2012; Wilson et al., 2007; Newell et al., 2006; Watson, 1996) and retrospective designs (Crowley et al., 2011; Cromwell et al., 2000). Prospective studies observe a specific cohort over the testing period and record injury details and risk factors as injuries occur (Brooks and Fuller, 2006). In contrast, retrospective designs analyse data that has already happened or been collected (Mann, 2003). Prospective data collection methods are associated with reduced recall bias and more accurate estimations of the duration of physical activity, issues that are generally associated with retrospective studies (Junge and Dvorak, 2000). When compared, the retrospective injury rate per 1000 hours of exposure was approximately one third of the prospective rate recorded (Junge and Dvorak, 2000). Therefore, prospective monitoring of injured and non-injured athletes can allow for more accurate results.

Accuracy of prospective cohort studies is also dependent upon the specific method of data collection. Injuries have been recorded using questionnaires (Cromwell et al., 2000; Watson, 1996), interviews (Wilson et al., 2007) and reviews of insurance claims (Crowley et al., 2011). However, the gold-standard method of collecting injury data is assessment by a medical professional (e.g., physician, athletic therapist or physiotherapist) (Junge and Dvorak, 2000) and recording the data utilising a standardised injury report form (Junge et al., 2008). This method has been utilised in the majority of previous Gaelic football epidemiological research (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; O'Connor et al., 2016a; Murphy et al., 2012; Newell et al., 2006) (Table 2.3; Table 2.4). Considerations for sample size are also important when examining data collection methods. Sample size can have a significant effect on the power of the study, where a greater sample size is associated with a lower confidence interval, indicating a greater likelihood of observing a significant difference (Brooks and Fuller, 2006). A large sample size has been utilised in a number of studies (Roe et al., 2018a; O'Connor et al., 2017; O'Connor et al., 2016a; Murphy et al., 2012; Newell et al., 2006) (Table 2.3; Table 2.4).

2.2.1.2.2. Injury Comparison

Comprehensive injury comparison may be limited by varying definitions of injury (Phillips, 2000), with medical treatment and time-loss injury definitions evident. A medical treatment definition accounts for injuries requiring treatment from a team physician, regardless of time-loss (Brooks and Fuller, 2006) and provides a greater depiction of the true burden of injury (Clarsen and Bahr, 2014). This definition can be very subjective, as one individual with a higher pain threshold may not report an injury but another player with a similar injury may present for treatment immediately. In addition, all injuries regardless of severity are accounted for, which can place undue pressure on medical staff. The inconsistent availability of medical staff, particularly in underage Gaelic games, can also result in a number of missed injuries.

A time-loss injury definition can be fully-inclusive (injuries resulting in time-loss from training/competition) or semi-inclusive (injuries resulting in time-loss from competition) (Brooks and Fuller, 2006). However, time-loss definitions do not account for acute injuries that allow individuals to continue to play and subjective differences, where a player plays through injury in their competitive season or when a victory is required, can have an effect. Time-loss injuries can also vary between sports where, for example, shoulder injuries may affect performance in overhead sports but may be less limiting in lower limb predominant sports, such as soccer. Time-loss injuries may be recorded more often in elite athletes who train frequently, whereas injuries may go unreported in athletes training less often who may not miss any time from play. A semi-inclusive time-loss definition is dependent on the frequency of games as the impact of the injury on an individual's capacity to participate in training is ignored. Gaelic football research has utilised time-loss (O'Connor et al., 2020; Roe et al., 2018a; Murphy et al., 2012; Newell et al., 2006) and medical treatment definitions (Crowley et al., 2011), while Wilson et al. (2007) combined both definitions (Table 2.3; Table 2.4). The most comprehensive injury definition utilised to date has incorporated both time-loss and restricted performance (O'Connor et al., 2017; O'Connor et al., 2016a; Cromwell et al., 2000) (Table 2.3; Table 2.4).

Recurrent injuries can also be difficult to quantify as an injury of the same type and location may not be a recurrence of a previous injury but damage to a structure in a similar location. O'Connor et al. (2020) and Murphy et al. (2012) described recurrent Gaelic

football injures as injures of the same type occurring at the same site as an index injury following full return to participation. However, O'Connor et al. (2017) and O'Connor et al. (2016a) described recurrent injuries as injuries of the same type that occur at the same or similar site as the original injury after full return to participation, regarded as a strict, precise definition, which mirrors the definition adopted by the International Rugby Board Council (Fuller et al., 2007).

Injuries can be reported as absolute number (injuries per season), prevalence or incidence (Brooks and Fuller, 2006; Knowles et al., 2006). Prevalence denotes the proportion of athletes who are injured at a particular time, while incidence refers to the number of new injuries during a specified time (Knowles et al., 2006), which can be expressed as incidence proportion, incidence rate or clinical incidence. Incidence proportion represents the number of injured athletes as a proportion of the total number of athletes at risk, incidence rate is the total number of injuries per unit of exposure time, while clinical incidence indicates the average number of injuries per athlete (Knowles et al., 2006). Exposure can be calculated per 1000 or 10,000 total hours of participation, training or match hours or athlete exposures, where an athlete exposure is defined as "participation in scheduled team practices or games during the course of the season" (Knowles et al., 2006, p.211). Accounting for exposure when reporting injuries is important as differences may be evident between players, with some individuals simultaneously playing at sub-elite (club or school) and elite (county) levels, while their peers may have reduced participation rates in comparison.

Repeat incidence proportion, reported as the number of repeat injured participants as a proportion of total injured participants (Knowles et al., 2006), is an additional measure indicating if sustaining one injury increases the probability of sustaining another injury. Incidence proportion and incidence rate are preferred when quantifying injury, as they determine the true risk of injury and allow comparisons between studies and sports (Phillips, 2000). Clinical incidence, absolute number and prevalence offer no representation of the risk of injury, however, clinical incidence may be useful to determine the projected burden on clinical resources. The time-period of observation is also important as studies conducted over a season, year or part of a year, are likely to yield varying results (Fuller et al., 2006) and can make comparisons between sports more difficult. Gaelic football research has reported injury incidence per 1000 hours of

participation over a season or number of seasons (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; O'Connor et al., 2016a; Murphy et al., 2012; Crowley et al., 2011; Wilson et al., 2007; Newell et al., 2006) (Table 2.3; Table 2.4).

Incidence rates in adult male and female Gaelic footballers range from 2.4 to 17.9 injuries per 1000 hours (Table 2.3) (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; Murphy et al., 2012; Crowley et al., 2011; Wilson et al., 2007; Newell et al., 2006). Lower incidence rates of 4.9 to 7.1 injuries per 1000 hours are evident in adolescent Gaelic footballers (Table 2.4) (O'Connor et al., 2016a; Watson, 1996). Physical and physiological differences between young and mature athletes (Adirim and Cheng, 2003) present various reasons for differences observed in injury incidence rates and will be discussed later in this literature review. Match injuries (25.1 to 64.0 injuries per 1000 hours) occur more often than training injuries (3.9 to 7.3 injuries per 1000 hours) in adult Gaelic footballers (Table 2.3) (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; Murphy et al. 2012; Wilson et al. 2007; Newell et al. 2006). Similarly, match injuries (9.3 to 17.6 injuries per 1000 hours) are more common than training injuries (3.0 to 3.1 injuries per 1000 hours) in adolescent Gaelic footballers (Table 2.4) (O'Connor et al., 2016a; Watson, 1996). Training injuries may be less common as managerial supervision at training can create a more controlled setting (Newell et al., 2006) and there is a focus on non-contact skill sessions and less intense player contact (Murphy et al., 2012). In comparison, the greater intensity of match play coupled with competitiveness and a desire to win duly explains the greater incidence of match injuries (Wilson et al., 2007).

2.2.2. Injury Profile

Along with examining the occurrence of injury, a thorough understanding of the profile of injury is necessary when detailing the descriptive epidemiology of sports-related injuries (Figure 2.1). In particular, knowledge of the severity, type, nature, location and mechanism of injury are important, in addition to an awareness of injury risk factors, in order to understand the extent of the injury problem in Gaelic football.

2.2.2.1. Severity of injury

Injury severity, indicating the impact of injury, can be classified in terms of time lost from sport, school and work (Junge and Dvorak, 2000). Gaelic football research predominantly classifies injuries as minor/mild (1 to 7 or ≤7 days), moderate (8 to 21 days) or severe

(>21 days) (Table 2.5) (O'Connor et al., 2020; O'Connor et al., 2017; O'Connor et al., 2016a; Wilson et al., 2007; Newell et al., 2006). The majority of injuries recorded in adult Gaelic football are moderate (42.0% to 56.0%) (O'Connor et al., 2020; Roe et al., 2018a; Murphy et al., 2012; Wilson et al., 2007; Newell et al., 2006; Cromwell et al., 2000) (Table 2.5). However, injuries in adolescent Gaelic footballers are predominantly minor (41.7%) (O'Connor et al., 2016a) (Table 2.5). In addition, the majority of adolescent Gaelic footballers (66.7%) continue to play and train when injured (O'Connor et al., 2016a), while 44.0% to 85.1% of adults discontinue their activity (O'Connor et al., 2017; Newell et al., 2006; Cromwell et al., 2000) (Table 2.5).

Younger Gaelic footballers may experience less serious injuries than their adult counterparts as they are smaller and cannot transmit forces of the same magnitude (Wilson et al., 2007). Therefore, injuries caused by impact during training or matches may be less common in adolescents. In addition, adolescents may not seek treatment for minor injuries and thus, may return to play earlier than recommended and without adequate rehabilitation. In other cases, parents, coaches and medical staff may express an air of caution by restricting play of younger athletes with less severe injuries, which may not cause time-loss in adult footballers. Moderate injuries may also be more prevalent in adult players as previous injury and age-related muscle deficits evident in older players can increase the risk of injury (Gabbe et al., 2006). Adult players are also more likely to have an allied healthcare professional present at their games who may remove them from play, with adolescent teams lacking similar supports. In addition, the intensity of Gaelic football may be greater in adults, who report greater high-speed metrics (>17 km/h) (1731±659m) (Malone et al., 2016) than youth players (851±297m) (Reilly et al., 2015), which may increase the prevalence of injuries of greater severity. The distance covered during matches by adults (7135±1195m) (Daly et al., 2020) compared to adolescents (5774±737m) (Cullen et al., 2017), duration of game play and team tactics may also increase adults players risk of experiencing injuries of greater severity.

The severity of injury can also be expressed in terms of the burden of the injury, determined according to the number of days absent from play per 1000 hours of player exposure (Brooks and Fuller, 2006). Injury burden takes into account both incidence and severity (Bahr et al., 2018) and can be a useful measure in identifying injury prevention priorities. The burden of injury in elite male adult Gaelic footballers is 238.3 days per

1000 exposure hours (Roe et al., 2018a), while the burden of lower limb (206.2 days per 1000 exposure hours) (Roe et al., 2018b) and hamstring injuries (57.2 days per 1000 exposure hours) (Roe et al., 2018c) have also been reported.

Table 2.5 Severity of injury in male and female adult and adolescent Gaelic football

Study	Participants	Severity				
		Severity Classification	Severity Definition	Severity Reported	Time lost	Ability to continue
O'Connor et al. (2020)[1]	Adults	Minor Moderate Severe	≤7 days 8-21 days >21 days	25.6% 37.2% 37.2%	23.5 ± 33.4 days	NR
Roe et al. (2018a)	Adults	Mild Moderate Severe	1-7 days 8-28 days 29+ days	27.0% 49.8% 23.2%	All regions – 25.7 days Lower limb – 25.4 days Upper limb – 28.8 days Trunk – 28.9 days Head/neck – 13.3 days	NR
O'Connor et al. (2017)	Adults	Minor Moderate Severe	≤7 days 8-21 days >21 days	34.8% 29.8% 35.5%	Lower limb – 5.1 to 80.8 days Upper limb – 4.8 to 39.3 days Trunk – 9.1 to 31.1 days Head – 6.1 days	14.9% continued playing
O'Connor et al. (2016a)[2]	Adolescents	Minor Moderate Severe	≤7 days 8-21 days >21 days	41.7% 20.8% 37.5%	NR	66.7% continued playing and training
Murphy et al. (2012)	Adults	Mild Moderate Severe	NR NR NR	13.2% 45.2% 41.6%	Muscle 19.7 days Ligament (excluding ACL) 25.3 days Tendon 32.4 days Fracture 38.7 days	NR
Crowley et al. (2011)	Adults	NR	NR	NR	NR	NR
Wilson et al. (2007)	Adults	Mild	1-7 days	4.35 per 1000h	NR	NR

		Moderate Severe	8-21 days >21 days	6.45 per 1000h 2.55 per 1000h		
Newell et al. (2006)	Adults	Minor Moderate Severe	1-7 days 8-21 days >21 days	10.0% 56.0% 34.0%	<u>Of the severe injuries-</u> 12% caused the player to be unable to participate fully for a period of over 6 weeks 3% caused the player to miss the rest of the season	44% immediately stopped activity 19% stopped activity at a later stage of training or game 37% completed game or training session
Cromwell et al. (2000)	Adults	Minor Moderate Major	1-7 days 8-27 days > 28 days	38.0% 42.0% 20.0%	34.6 days per year	54% training or completion was discontinued 46% continued to play
Watson (1996)[2]	Adolescents	Mean time injured	Time in hospital Time off sport Restricted activity	0.51 ± 1.7 days 34.27 ± 37.08 days 13.98 ± 5.22 days	NR	NR

Note: ACL=anterior cruciate ligament; NR=not reported; [1]females; [2]adolescents.

2.2.2.2. Type, Nature and Location of Injury

The lower extremity is most commonly injured, accounting for 67.0% to 77.0% of all injuries (Table 2.6) (O'Connor et al., 2020; O'Connor et al., 2016a; Murphy et al., 2012; Crowley et al., 2011; Wilson et al., 2007; Newell et al., 2006; Cromwell et al., 2000). Muscle (17.5% to 52.0%) and ligament (10.8% to 33.0%) injuries are most frequently recorded (Table 2.6) (Roe et al., 2018a; O'Connor et al., 2017; O'Connor et al., 2016a; Murphy et al., 2012; Crowley et al., 2011; Wilson et al., 2007; Newell et al., 2006; Cromwell et al., 2000; Watson, 1996). A specific breakdown of injured ligaments is not presented, although the high incidence of ankle (10.0% to 21.0%) and knee (5.0% to 18.7%) injuries suggests a proportion of these injuries are to ligamentous structures. A large volume of hamstring muscle injuries are also evident in adolescents (6.5% to 13.3%) (O'Connor et al., 2016a; Watson, 1996) and adults (12.2% to 25.0%) (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; Murphy et al. 2012; Crowley et al. 2011; Wilson et al. 2007; Newell et al. 2006; Cromwell et al. 2000). Gaelic football is a full-contact sport requiring a substantial amount of high speed running (Gabbe et al., 2006), involving rapid acceleration and deceleration, which can place the hamstring muscles in a vulnerable injury position (Liu et al., 2012) and increase the risk of muscle injury. In addition, the higher prevalence of hamstring injury in adult Gaelic footballers may be due to the greater risk of previous injury, which acts as a predictor of recurrent hamstring injury (Gabbe et al., 2006).

Contusions account for 5.4% to 27.8% of all injuries in adults and adolescents (Table 2.6) (Roe et al., 2018a; O'Connor et al., 2017; O'Connor et al., 2016a; Wilson et al., 2007; Newell et al., 2006; Cromwell et al., 2000; Watson, 1996), which may be attributed to the nature of Gaelic football and the high-velocity contact permitted (McIntyre, 2005). Fractures were common (30.3%) in research by Crowley et al. (2011), a retrospective examination of insurance claims from one season. However, this method of study design fails to account for less serious injuries that do not require medical treatment and a subsequent insurance claim (Junge and Dvorak, 2000) and may over report the rate of fractures. Consensus on the low rate of fractures (4.0% to 10.0%) is evident in prospective research (Table 2.6) (O'Connor et al., 2017; O'Connor et al., 2016a; Murphy et al., 2012; Wilson et al., 2007; Cromwell et al., 2000; Watson, 1996).

Most Gaelic football injuries are classified as new injuries (52.7% to 76.6%) (Table 2.6) (O'Connor et al., 2020; O'Connor et al., 2017; O'Connor et al., 2016a; Murphy et al., 2012). O'Connor et al. (2016a) reported early (14.9%), late (16.2%) and delayed/persistent recurrent injuries (16.2%) in adolescents (Table 2.6). Early (3.8% to 8.5%), late (2.1% to 10.5%) and delayed/persistent recurrences (6.3% to 15.0%) have also been reported in adults (Table 2.6) (O'Connor et al., 2020; O'Connor et al., 2017; Murphy et al. 2012). Recurrent injuries were higher in Roe et al. (2018a), however, recurrence was reported separately for training and match injuries. Recurrent injuries are most common in adolescent players, which may be attributed to the premature return to participation following injury, leaving the player susceptible to recurrent injury (O'Connor et al., 2016a). The high incidence of recurrent injury across both adult and adolescent players also supports previous injury as a significant risk factor for future injury (Gabbe et al., 2006), with adolescents acknowledging previous injury as the cause of 11.2% of injuries (Watson, 1996).

2.2.2.3. Mechanism of Injury

Non-contact injuries are prevalent in adolescent (64.0%) (O'Connor et al., 2016a) and adult Gaelic footballers (50.4% to 73.2%) (O'Connor et al., 2020; Roe et al., 2018a; Murphy et al., 2012; Newell et al., 2006) (Table 2.7). Sprinting is noted as the most common mechanism of injury in adolescents (25.7%) (O'Connor et al., 2016a) and is also commonly noted in adult players (14.4% to 26.8%) (Table 2.7) (O'Connor et al., 2020; O'Connor et al., 2017; Murphy et al., 2012; Wilson et al., 2007). Roe et al. (2018c) indicated that 61.1% to 84.3% of hamstring injuries in elite male Gaelic footballers occur during sprinting. The high speed nature of the game and requirement for speed when in possession of the ball may account for the excessive load placed on the body. Almost one-quarter of adolescent Gaelic footballers report no specific injury mechanism (24.3%) (O'Connor et al., 2016a), suggesting overuse or minor injuries are common, where no specific event initiated injury or no mechanism is recalled. In contrast, tackling, being tackled or collisions with other players are common contact mechanisms of injury in adult Gaelic footballers (7.1% to 39.0%) (O'Connor et al., 2020; O'Connor et al., 2017; Murphy et al. 2012; Wilson et al., 2007; Newell et al., 2006; Cromwell et al., 2000). Differences in body composition (e.g., greater height, body mass and adiposity) may allow for greater momentum to be generated, which may explain the volume of injuries in adults attributed to tackles and collisions.

Table 2.6 Type, nature and location of injury in male and female adult and adolescent Gaelic football

Study	O'Connor et al. (2020)[1]	Roe et al. (2018a)	O'Connor et al. (2017)	O'Connor et al., (2016a)[2]	Murphy et al. (2012)	Crowley et al. (2011)	Wilson et al. (2007)	Newell et al. (2006)	Cromwell et al. (2000)	Watson (1996)[2]
	Type of Injury									
Muscle	NR	44.9%	32.4%	30.7%	42.6%	52.0%	23.3%	42.0%	34.0%	17.5%
Tendon			6.3%	10.0%	9.2%	NR	NR		16.0%	NR
Fracture		NR	7.0%	4.0%	4.4%	30.3%	10.0%	NR	5.0%	8.5%
Ligament		10.8%	27.5%	22.7%	13.2%	NR	17.8%	26.0%	33.0%	21.6%
Contusion		5.4%	16.9%	8.0%	NR	NR	27.8%	17.0%	6.0%	6.5%
Cartilage		NR	2.8%	5.3%			NR	NR	3.0%	NR
Dislocation			1.4%	1.3%					NR	
Fatigue-induced muscle disorder			4.2%	13.3%						
Other		9.9%	1.4%	NR						
	Nature of Injury									
New	72.5%	T – 38.7% M – 78.0%	76.6%	52.7%	74.7%	NR	NR	NR	NR	NR
Early recurrent	3.8%	T – 35.6% M – 59.3%	8.5%	14.9%	6.9%					
Late recurrent	8.8%	T– 46.8% M – 44.6%	2.1%	16.2%	10.5%					

Persistent/Delayed	15.0%	T – 47.0% M – 44.6%	12.8%	16.2%	6.3%					
Recurrent	27.5%	T – 35.6% M – 22.0%	NR	NR	NR				35.0%	
	Location of Injury									
LE	67.1%	NR	NR	74.7%	76.0%	67.0%	71.7%	70.0%	77.0%	NR
UE	13.9%			20.0%	11.1%	21.0%	NR	5.0%	23.0%	
Trunk/spine	3.8%			5.3%	7.9%	9.0%		NR	NR	
Head/neck	12.7%		5.6%	NR	3.6%					
Knee	12.7%	11.1%	14.1%	18.7%	11.3%	14.0%	8.0%	13.0%	13.0%	5.0%
Hip, pelvis and groin	5.1%	14.9%	14.0%	13.3%	9.4%	NR		9.0%	NR	NR
Hamstring	21.5%	23.9%	15.5%	13.3%	24.0%	25.0%	12.2%	22.0%	13.0%	6.5%
Ankle	10.3%	11.7%	11.3%	12.0%	10.0%	17.0%	13.3%	11.0%	21.0%	15.1%
Wrist, hand and fingers	6.3%	NR	10.6%	12.0%	NR	NR	NR	NR	NR	9.5%
Quadriceps	11.4%	9.3%	6.3%	8.0%			12.2%			NR
Calf	1.3%	NR	5.6%	6.7%			NR			
Shoulder	1.3%		4.2%	6.7%				7.0%	12.0%	
Lower back	1.3%		3.5%	5.3%				6.0%	NR	10.0%
Head and face	12.7%		NR	NR			7.8%	NR		NR
Chest/ribs	0.0%		3.5%				4.4%			

Note: early recurrent=less than 2 months; late recurrent=2 to 12 months; persistent/late recurrent=greater than 12 months; LE=lower extremity; M=match; NR=not reported; T=training; UE=upper extremity; [1]females; [2]adolescents.

Table 2.7 Mechanism of injury in male and female adult and adolescent Gaelic football

Study	O'Connor et al. (2020)[1]	Roe et al. (2018a)	O'Connor et al. (2017)	O'Connor et al. (2016a)[2]	Murphy et al. (2012)	Wilson et al. (2007)	Newell et al. (2006)	Cromwell et al. (2000)
Contact	33.7%	36.8%*	NR	36.0%	32.2%	NR	40.0%	NR
Non-contact	66.3%	73.2%*		64.0%	50.4%		60.0%	
Player to player contact	NR	NR	NR	NR	32.2%	NR	NR	NR
Sprinting			24.8%	25.7%	26.8%	14.4%		
No specific MOI	10.1%		9.9%	24.3%	NR	NR		
Being tackled	7.6%		13.5%	12.2%		17.8%		
Jumping/catching	5.1%		8.5%	10.8%		NR		
Kicking	6.3%		7.8%	9.5%	4.5%			
Turning	6.3%		8.5%	NR	12.0%	13.3%		19.0%
Landing	7.6%		9.2%		7.1%	NR		NR
Tackling opposition	7.6%		7.1%		NR	10.0%		12.5%
Running, twisting, acceleration, deceleration	NR		NR			NR	45.0%	NR
Collisions with, tackled or struck by another player							39.0%	
Collision							NR	22.0%
Running								13.0%
Running/sprinting	38.0%							NR
Falling	7.6%							
Blocking	3.8%							

Note: MOI=mechanism of injury; NR= not reported; *=mechanism of injury was only reported for match injuries; [1]females; [2]adolescents.

2.2.3. Injury Risk Factors

Injuries can occur due to complex interactions between intrinsic and extrinsic and modifiable and non-modifiable risk factors (Meeuwisse et al., 2007; Bahr and Holme, 2003). An athlete can be predisposed to injury due to the presence of intrinsic risk factors specific to the individual (Meeuwisse et al., 2007), such as age, previous injury, gender, body composition, bone strength, neuromuscular control, anatomy, physical fitness and skill level (Caine et al., 2008; Meeuwisse et al., 2007; Bahr and Holme, 2003). Exposure to external environmental risk factors can also increase susceptible to injury, with the reaction to other athletes, pitch conditions, officiating decisions, use of protective sporting equipment, spectator environment or level of importance of a particular game having an effect (Caine et al., 2008; Meeuwisse et al., 2007; Bahr and Holme, 2003). This section will examine injury risk factors in Gaelic footballers, including time of injury, playing position, protective equipment and foul play.

2.2.3.1. Time of Injury

Time or chronometry of injury (number of minutes into training or competition before injury occurs) has been examined as a risk factor in a number of previous Gaelic football epidemiological research studies (Table 2.8). Injuries are most frequent in the second half of training and matches for both adolescents (56.0%) (O'Connor et al., 2016a) and adult Gaelic footballers (33.0% to 71.3%) (Table 2.8) (O'Connor et al., 2020; O'Connor et al., 2017; Wilson et al., 2007; Newell et al., 2006; Cromwell et al., 2000). In particular, the majority of injuries occur in the 4th quarter in adolescents (36.0%) (O'Connor et al., 2016a) and adults (29.3% to 55.0%) (O'Connor et al., 2020; O'Connor et al., 2017; Wilson et al., 2007; Newell et al., 2006) (Table 2.8). The effects of fatigue, defined as the failure to maintain the required or expected force or power output (Edwards, 1983), and slower reaction times may explain the high volume of injuries evident in the final minutes of play (Newell et al., 2006). In addition, fatigue has been demonstrated to alter hip and knee kinematics during the crossover cut manoeuvre in Gaelic footballers, which may increase injury risk (Whyte et al., 2018). The incorporation of repetitive maximal sprint training bouts towards the end of a training session can also have an effect on injury (Newell et al., 2006), as the body may be in a fatigued state due to sports-specific, contact drills completed prior to this point. Interestingly, 17.4% of injuries in adolescent Gaelic footballers occur during the warm-up (O'Connor et al., 2016a), whereas in adults, 1.7%

to 10.0% of injuries have been recorded in this period (Wilson et al., 2007). Inadequate warm-up may cause injury in the initial minutes of exercise (Caine et al., 2006) and the differences evident between adolescent and adult Gaelic footballers could be attributed to a higher coaching standard at adult level with greater consideration for appropriate warm-up techniques.

Table 2.8 Time of injury in male and female adult and adolescent Gaelic football

Study	O'Connor et al. (2020)[1]	O'Connor et al. (2017)	O'Connor et al. (2016a)[2]	Wilson et al. (2007)	Newell et al. (2006)	Cromwell et al. (2000)
Warm-up	10.0%	NR	17.4%	1.7%		
Cool down	NR		2.9%	1.7%		NR
1st quarter	10.0%	9.9%	20.0%	17.2%	NR	
2nd quarter	23.3%	18.8%	24.0%	22.4%		29.0%
3rd quarter	23.3%	22.8%	20.0%	27.6%		
4th quarter	33.3%	48.5%	36.0%	29.3%	55.0%	33.0%

Note: NR=not reported; [1]females; [2]adolescents.

2.2.3.2. Playing Position

Player positioning during match play is a suggested risk factor for injury, with 33.9% of midfield adolescent players experiencing an injury over the season (O'Connor et al., 2016a). Adolescent Gaelic footballers playing at midfield cover greater distances (6740m) compared to backs (5089m to 6592m) and forwards (4660m to 6151m) (Reilly et al., 2015). In addition, high intensity exercise (travelling >17 km/h) accounts for 14.8% of the total distance covered by adolescents during Gaelic football match play (Reilly et al., 2015). As midfielders are covering greater distances and likely to be working at this high intensity for greater periods than other players (McIntyre, 2005), this factor may explain adolescent midfielders increased injury risk. Adolescent defenders (25.7%) and forwards (24.4%) experience similar rates of injury (O'Connor et al., 2016a), as also evident in adult defenders (5.1 injuries per 1000 hours) and forwards (6.1 injuries per 1000 hours) (Wilson et al., 2007). The inherent risk of injury regardless of position may be attributed to the physicality and high intensity nature of the game (Murphy et al., 2012). Injuries to the adolescent goalkeeper account for 16.0% of all injuries (O'Connor et al., 2016a), while 7.1 injuries per 1000 hours are reported in adult goalkeepers (Wilson et al., 2007). Goalkeepers have been recorded as being taller and heavier than defenders

and forwards (Cullen et al., 2013) and are required to complete movement's indicative to the position, such as diving and blocking the football, adding to the risk of sustaining an injury.

2.2.3.3. Protective Equipment

The use or lack of protective equipment can be an additional injury risk factor in Gaelic football. The wearing of a mouth guard is currently mandatory for Gaelic footballers, which was first introduced for youth players in 2013 and adults in 2014 (Gaelic Athletic Association, 2014a). Mouth guards were introduced to reduce dental injuries, accounting for 3.0% of all injuries in adult Gaelic footballers (Crowley et al., 2011). However, the introduction of new equipment can be contentious as it may increase risk-taking behaviour and alter injury risk (Verhagen et al., 2010). Other than the mandatory gum shield, protective equipment was utilised by 26.7% of adolescent Gaelic footballers but a breakdown of equipment was not provided (O'Connor et al., 2016a). The use of ankle supports has been reported by 22.0% of adults (Cromwell et al., 2000). Inadequate equipment (poor kit or boots) was reported as the cause of 11.2% of injuries by adolescent players (Watson, 1996).

2.2.3.4. External Factors

Foul play may explain 14.3% (O'Connor et al., 2016a) to 34.8% (Watson, 1996) of injuries in adolescent Gaelic footballers. These research studies were conducted 20 years apart, which may explain the range of injuries attributed to foul play. Referees working in youth Gaelic football may lack the experience of officials in charge of adult games, allowing more foul play and increasing the risk of injury. Environmental conditions and in particular, poor state of the playing field, has also been acknowledged as an injury risk factor, self-reported to cause 17.4% of injuries in adolescents (Watson, 1996). Similarly, adult participants report the pitch condition accounts for 29.0% of injuries, with a dry/hard surface (43.0%), wet/soft surface (39.0%) and uneven ground (18.0%) perceived to influence injury risk (Cromwell et al., 2000). Due to the fact that Gaelic football is an amateur sport governed by a voluntary organisation and the unpredictable nature of Irish weather, surface conditions that do not affect the risk of injury may be difficult to deliver.

2.2.4. Summary of the Epidemiology of Injury

The currently available literature highlights the dearth of knowledge pertaining to the epidemiology of injury in adolescent Gaelic footballers. There are currently two available

studies examining the incidence and characteristics of injury in male adolescent Gaelic footballers (O'Connor et al., 2016a; Watson et al., 1996). However, one study (Watson et al., 1996) was conducted over 20 years so the applicability of the findings to current adolescent Gaelic footballers is questionable, while the other study focused on older adolescent Gaelic footballers with an average age of 15.7 years (O'Connor et al., 2016a). Identifying the extent of the injury problem through epidemiological research is an essential step for initiating injury prevention measures. Thus, the literature presented highlights the need for prospectively examining the epidemiology of injury in young male adolescent Gaelic footballers, with consideration of the incidence and characteristics of injury and the associated injury risk factors.

2.3 Special Considerations for Injuries in the Adolescent Athlete

A dearth of epidemiological research examining injuries in youth Gaelic footballers was identified in Section 2.2 but the examination of injuries in adolescent Gaelic footballers requires special considerations. Growth is a normal physiological process in adolescents, generally occurring between 13 and 15 years (Dalton, 1992), but large individual differences in the timing of the adolescent growth spurt are evident (Van der Sluis et al., 2014). Growth occurs at the epiphyseal plate, where bone is laid down between the metaphysis and epiphysis (Malanga and Ramirez-Del Toro, 2008). Linear growth occurs first in bones, followed by secondary growth in connective soft tissue (muscles, ligaments and tendons), which can lead to myo-osseous disproportion (Patel and Nelson, 2000). This imbalance can lead to acute injuries, due to decreased flexibility and excess stress at the tendon insertion and musculotendinous junction (Kennedy et al., 2005; Patel and Nelson, 2000). Bone mineralisation is also delayed compared with linear bone growth, making the bone temporarily more porous and at risk of injury (Bailey et al., 1989). Acute injuries to the growth plate account for about 15.0% to 20.0% of all injuries to long bones (Patel and Nelson, 2000) and are most commonly seen with increases in training frequency (Kennedy et al., 2005). Bony malalignments, such as hip coxa vara or valga or knee genu varum or valgum (Dalton, 1992), or a history of developmental hip dysplasia (Weiss and Ramachandran, 2006) can also increase the likelihood of imbalances during growth spurts.

Specific developmental conditions, in particular, apophysitis, osteochondrosis and stress fractures, can occur in adolescents. Apophysitis is a traction injury occurring at the junction between a tendon or musculotendinous unit and the epiphysis (Malanga and Ramirez-Del Toro, 2008). Repeated muscular contractions during periods of rapid growth cause micro-avulsions, leading to an inflammatory reaction (Adirim and Cheng, 2003; Patel and Nelson, 2000) and a possible avulsion fracture. Apophysitis commonly occurs at the insertion of the patellar tendon on the tibial tuberosity (Osgood-Schlatter disease), Achilles tendon on the calcaneus (Sever's disease), patellar tendon on the apex of the patella (Sinding-Larsen-Johansson syndrome) and medial epicondyle of the elbow (Little League Elbow). Each apophysitis is caused by varying mechanisms at different stages of development (Table 2.9) (Valentino et al., 2012; Soprano, 2005; Adirim and Cheng, 2003). Apophysitis may be considered an overuse injury, where repetitive submaximal stress occurs with highly intensive sessions without adequate recovery or sudden increases in intensity, volume or frequency (Malanga and Ramirez-Del Toro, 2008; Patel and Nelson, 2000). Overuse injuries are common in adolescents due to their simultaneous participation in a variety of sports and varying age groups in those sports (Soprano, 2005).

Table 2.9 Common apophysitis injuries (Valentino et al., 2012; Soprano, 2005; Adirim and Cheng, 2003)

Location	Presentation Age	Mechanism of Injury
Osgood-Schlatter disease	11 to 15 years	Impact and deceleration activities, such as running, jumping and cutting
Sever's disease	7 to 12 years	Impact sports, especially those that involve running and repetitive jumping and landing actions
Sinding-Larsen-Johansson syndrome	10 to 14 years	Repetitive eccentric and deceleration loading of the extensor mechanism, especially in running, jumping and kicking sports
Little League Elbow	Under 10 years	Repetitive throwing actions

Osteochondrosis describes degenerative changes in the epiphyseal ossification centres of growing bones (Achar and Yamanaka, 2019). A common form of osteochondrosis, Legg-Calvé-Perthes disease, an osteonecrosis of the femoral head (Achar and Yamanaka, 2019), is typically seen in children aged 7 years but its presence may not be detected until

closer to adolescence (Kovacevic et al., 2011). Osteochondrosis is assumed to be idiopathic (Malanga and Ramirez-Del Toro, 2008) but may also be attributed to repetitive or frequent micro-trauma, localised vascular insufficiency, increased athletic activity, imbalanced axial load, ligamentous instability, genetic predisposition or abnormal ossification within the epiphysis (Patel and Nelson, 2000; Bohndorf, 1998). An additional developmental condition, slipped capital femoral epiphysis (SCFE), where the metaphysis of the femur moves anterosuperiorly in relation to the capital femoral epiphysis through the epiphysis, is commonly seen in 10 to 16 year olds (Kovacevic et al., 2011). SCFE generally occurs due to the pubertal growth spurt but may also be associated with trauma, inflammatory conditions or endocrine disorders (Kovacevic et al., 2011).

Stress fractures account for up to 15.0% of all activity-related injuries in adolescents (Beck and Matheson, 1999). Bone requires load for normal bone growth and development (Patel and Nelson, 2000) but a balance between physical activity and bone stress is required (Dalton, 1992). Insufficiency stress fractures can occur when normal stress is applied to structurally weakened bone, while fatigue fractures occur when repetitive, excessive forces are applied to normal bone (Patel and Nelson, 2000). Sudden increases in training, poor biomechanics, inadequate footwear, young age and poor nutrition and bone mineral density are suggested to cause stress fractures (Malanga and Ramirez-Del Toro, 2008).

2.3.1. Injury Risk Factors Specific to Adolescents

Due to anatomical, physiological and biomechanical differences evident between adults and adolescents and the issues highlighted in Section 2.3, adolescents may have additional or varying injury risk factors compared to adults. These differences include physical characteristics, training schedules and psychological issues.

2.3.1.1. Physical Characteristics

Adolescent players with greater height and mass generate higher speeds and impact forces (Adirim and Cheng, 2003; Patel and Nelson, 2000), increasing the risk of injury for smaller players tackling or colliding with a larger player. Pubertal and hormonal changes can also cause muscle hypertrophy, greater mass, speed and power and more aggressive and risk-taking behaviours (Kraus et al., 2012; Adirim and Cheng, 2003; Patel and

Nelson, 2000), adding to the risk of injury. In addition, obese adolescent athletes have a 34.0% increased risk of musculoskeletal injury (Richmond et al., 2013), as they sustain greater forces in both daily and physical activities, which are absorbed through joints and soft tissue structures (Emery, 2005). Size also comes into account when adolescent participants compete in adult competitions simultaneous to underage competitions, which is commonly evident in the GAA, as adult participants are generally taller and heavier than adolescent Gaelic footballers (Cullen et al., 2013; McIntyre, 2005), increasing adolescents risk of injury.

Flexibility in adolescent males declines from age seven through to mid-adolescence before increasing in late adolescence (Patel and Nelson, 2000). In contrast, isometric strength increases linearly from youth into adolescence, with strength gains intensifying at 13 years in males (Beunen and Malina, 2008). The evident imbalances between flexibility and strength can increase injury risk (DiFiori, 2010). A lack of proprioceptive control in the growing adolescent can also cause the application of excessive forces to structures above their physiological threshold (Hakizimana and Louw, 2006), increasing injury risk. Proprioception may be affected by changes in body mass during a growth spurt, which can impair stability by changing the position of the body's centre of mass and increasing rotational injuries in the knee and ankle (O'Rourke et al., 2005).

2.3.1.2. Training Schedule

Adolescents should engage in 60 minutes of moderate to vigorous physical activity daily (World Health Organisation, 2020), with high-intensity exercise recommended two to three days per week or on non-consecutive days (Faigenbaum et al., 2009). When a training schedule exceeds these recommendations and the developing musculoskeletal system experiences chronic repetitive stress (Myer et al., 2011), adolescents may be unable to tolerate load, perform technically sound movements or sufficiently recover, increasing the risk of injury (Myer et al., 2011). Safe and effective training needs to balance training demands with adequate recovery to elicit training adaptation goals while avoiding injury (Myer et al., 2011). The importance of safe and effective training is particularly important in Irish youths due to the prevalence of year-long training patterns, a congested calendar with overlap of match fixtures between sports and the prevalence of

Gaelic players playing with elite (county) and sub-elite (club and school) teams and varying age levels simultaneously.

2.3.1.3. Psychological Issues

Adolescent athletes face the challenge of balancing full-time education with sports participation (O'Neill et al., 2013) and may be put under additional pressure to perform to a certain standard to satisfy their parents or coaches (Hughes and Hassan, 2017) and be considered for team selection (Brown et al., 2017). With the societal influence of peer pressure (O'Neill et al., 2013) and the desire to achieve social status and peer recognition (Allen, 2003), adolescents may be under-pressure to gain weight, lift weights to get stronger, increase their flexibility and agility or participate in multiple activities simultaneously in order to develop sports-specific skills (Brown et al., 2017). Financial pressures, related to registration fees, equipment costs and travel expenses, are often passed from parents to adolescents (Merkel, 2013) and the pressure to perform may be enhanced as a result. In addition, young players may be pressurised to perform in order to achieve collegiate scholarships or bursaries for high-achieving scholarly athletes (Murphy et al., 2016). To satisfy all interests, the young player may engage in unhealthy practices (Brown et al., 2017), like substance abuse or illegal drug or alcohol use, play through injury or make a rushed return to sport (Podlog et al., 2013). In addition, young athletes may be pressurised to play year-round and in multiple sports at varying age-levels simultaneously, which increases exposure (Brenner, 2016) and potentially increases injury risk. An absence of adequate psychological coping skills compared to adults (Nicholls and Polman, 2007) may further enhance the problem.

2.3.2. Summary of the Special Considerations for Injuries in the Adolescent Athlete

Growth is a normal physiological process but young athletes can be exposed to injury and specific developmental conditions due to the accelerated period of growth that occurs during adolescence. In addition, unique factors related to physical characteristics, the training schedule and psychological issues can act as injury risk factors in adolescents. These special injury considerations in young athletes highlights the need for targeted injury epidemiology research in male adolescent Gaelic footballers as players' transition through this period of rapid growth and maturation.

2.4 Monitoring Load in Adolescents

With the propensity for injury in adolescent Gaelic footballers, consideration of applied loads are important. The demands of sports participation and the volume of time spent in training and in preparation for optimal sports performance has increased in recent times (Gould and Whitley, 2009). Monitoring load in adolescents allows coaching and sports medicine clinicians to assess if an athlete is optimally adapting to their applied load (Bourdon et al. 2017), which can be particularly important in adolescents who may be competing on a number of teams simultaneously with a variety of different coaches (Turner and Moore, 2016). Load, determined by the intensity and volume of the session, is defined as the total stress placed on an individual from multiple sessions over a period of time, external workloads performed or the internal response to that workload (Gabbett et al., 2014). Monotony, a measure of day-to-day variability during a training week and strain, the overall stress that the athlete is exposed to throughout the training week, are additional methods of monitoring load (Comyns and Flanagan, 2013).

Physiological adaptations do not occur when training volumes (duration of training or distance covered) and intensities (a measure of how hard you are training) are below the threshold where adaptations occur (Comyns and Flanagan, 2013) but on the other hand, excessive loads can result in injury, illness, overtraining or burnout (Bourdon et al., 2017). Burnout is defined as a psychological syndrome encompassing emotional and physical exhaustion, reduced athletic accomplishment and sport devaluation (Raedeke and Smith, 2001). In comparison, overtraining refers to psychological, physiological and hormonal changes that result in decreased sports performance (Brenner, 2007). Monitoring loads can also assist in avoiding injury and illness, which can lead to missed time from training or competition (Bourdon et al., 2017). Missed days from play can result in underperformance and may have a long-term impact on performance, as exposure is needed for adolescents to master the inherent skills of the sport (Murray, 2017). Injury can also influence overall team success, with injured athletes unavailable for competitive games. The importance of monitoring load in adolescents is highlighted in the significant relationship between high volumes of training and injury and early dropout and retirement from sport, with injury accounting for 9.1% of Irish male adolescents' dropout from sport (Murphy et al., 2017).

A training programme comprised of excessive and rapid week-to-week increases in load significantly increase an athlete's risk of injury and should be avoided (Bowen et al., 2017; Soligard et al., 2016). This relationship between load and injury risk can be explained by a U-shaped curve, where low and high loads increase the risk of injury but intermediate loads can reduce injury risk (Cross et al., 2016). The Acute: Chronic Workload Ratio (ACWR), which describes the acute load (from the previous week) in relation to the chronic load (average of the previous four weeks) (Blanch and Gabbett, 2016), explains that an athlete is considered well prepared for competition when the chronic load has systematically increased but the acute load is low (Blanch and Gabbett, 2016). However, excessively low loads do not provide adequate exposure to the training stimulus, increasing injury risk (Gabbett, 2016). Optimal ACWR ranges from 0.8 to 1.3 but the likelihood of injury increases if the ratio is less than 0.8 or exceeds 1.5 (Blanch and Gabbett, 2016). Given the potential negative impact of injury, the prescription of appropriate loads should be central to every training plan to facilitate a long sporting career with minimal injuries (Malone et al., 2017d; Murray, 2017).

There is a current lack of research examining load monitoring in adolescent Gaelic footballers. Research in elite adult Gaelic football has shown that under- and over-exposure to maximal velocity events (Malone et al., 2017c) or sudden load spikes (Malone et al., 2017d) are detrimental to athletes' performance and increase the risk of injury. Research in youth soccer (M=16.5±1.2 years) has shown players have a higher risk of traumatic injury if they train more (OR=1.14, $P<0.05$) or have high load (OR=1.01, $P<0.05$), monotony (OR=2.59, $P<0.05$) or strain (OR=1.01, $P<0.05$) (Brink et al., 2010). Youth soccer players with high accumulated weekly load, measured using GPS, also have a significantly higher risk of injury (RR=1.7 to 4.8; $P<0.05$) (Bowen et al., 2017). In elite Gaelic football, the greatest risk of injury exists when ACWR exceeds 2.0, but moderate to high ACWR of ≥1.35 to ≤1.50 protect against injury in the preseason and early in-season but not late in the season (Malone et al., 2017d). Overall, team-sport athletes are better able to sustain small increases or decreases in load rather than larger fluctuations (Soligard et al., 2016).

2.4.1. Methods of Monitoring Load

Load can be monitored via internal (session rating of perceived exertion (sRPE), training diaries, blood lactate, oxygen consumption, heart rate monitoring) or external measures (power output, speed, time-motion analysis, global positioning system (GPS), accelerometry). Internal load examines the physiological and psychological stress imposed by the training load, whereas external load assesses work done independent of the athlete's internal characteristics (Halson, 2014). Measures of load requiring equipment (heart rate monitoring, time-motion analysis and GPS) are accurate and offer extensive information on the applied stimulus (Comyns and Flanagan, 2013) but are associated with considerable expense and data analysis can be time-consuming (Comyns and Flanagan, 2013). External load measures also provide limited information about the implication of training dose to the athlete (Murray, 2017). Internal subjective load measures are deemed more sensitive and consistent than external measures (Saw et al., 2015) and allow coaches to determine if their perception of load is similar to that of the athletes' (Comyns and Flanagan, 2013). Therefore, this review will focus on subjective measures of internal load.

2.4.1.1. Session Rating of Perceived Exertion

sRPE is an easily administered, cost-effective, reliable, valid and non-invasive method of quantifying the intensity of a session (Malone et al., 2020; Malone et al., 2017d; Comyns and Flanagan, 2013) and can be utilised regardless of mode or location (Bourdon et al., 2017). An athlete's rating of session intensity, using the modified Borg CR-10 rating of perceived exertion scale (Table 2.10) (Foster et al., 2001), is multiplied by session duration to provide a measure of load in arbitrary units (AU) (Figure 2.2) (Comyns and Flanagan, 2013). Measuring load using sRPE also allows monotony and strain to be calculated (Figure 2.2) (Comyns and Flanagan, 2013). Load, monotony and strain values can then be utilised to provide coaches and sports medicine clinicians with an overview of workload from week-to-week and stress applied to athletes (Comyns and Flanagan, 2013).

Table 2.10 Modified Borg CR-10 rating of perceived exertion scale (Foster et al., 2001)

Rating	Description
0	Rest
1	Very, very easy
2	Easy
3	Moderate
4	Somewhat hard
5	Hard
6	
7	Very hard
8	
9	
10	Maximal

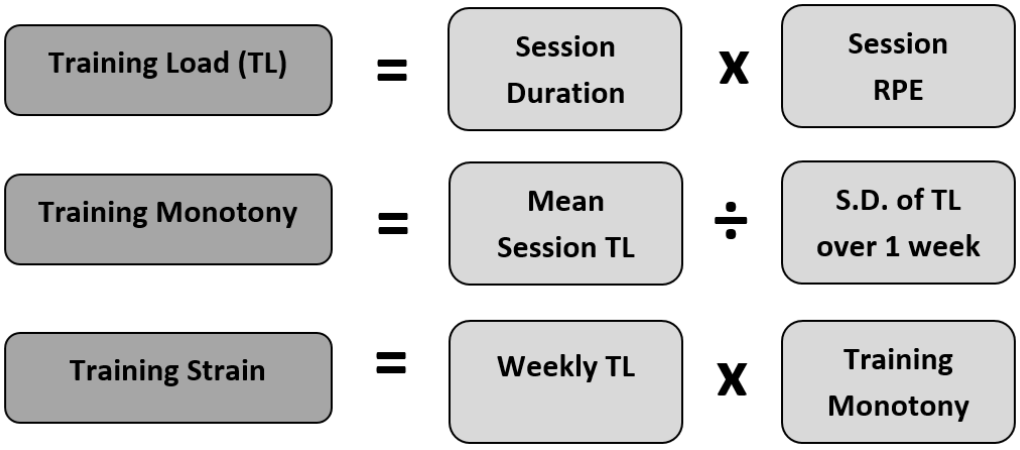

Figure 2.2 Calculating training load, training monotony and training strain (Comyns and Flanagan, 2013)

sRPE is recommended to be measured 30 minutes post-session for greater accuracy (Comyns and Flanagan 2013). However, retrospective sRPE has been shown to be reliable from 5 minutes to 24 hours post-exercise (Phibbs et al., 2017; Christen et al., 2016) and can remain consistent up to 48 hours post-exercise (Fanchini et al. 2017). The reliability of sRPE measured 72 hours post-exercise and beyond is questioned (Scantlebury et al., 2018; Phibbs et al., 2017). The use of RPE-related measures in adolescent athletes is advised to be used with caution as the ability of young adolescent athletes to understand sRPE and self-assess their awareness of load and effort can be

unreliable (Phibbs et al., 2017). In team sports, differences in recovery potential, exercise capacity, non-training stressors and stress tolerance may explain different reactions to training load between players (Bourdon et al., 2017). However, differences between individuals may be due to poor understanding of the RPE scale ratings (Comyns and Flanagan, 2013) but with adequate education and training on sRPE and correct reporting, adolescents can utilise the method successfully (Phibbs et al., 2017). sRPE has been shown to be a valid measure of quantifying training load in field-based team sports (Scott et al., 2013; Gabbett and Domrow, 2007; Impellizzeri et al., 2004).

2.4.1.2. Self-Recall Training Diaries

Self-recall training diaries are an additional method of monitoring load and are deemed a practical, inexpensive, easy to use and valid method of recording sessions over a period of time (O'Connor et al., 2016b; Hopkins, 1991). Training diaries provide a quantification of load using self-reported intensity and duration but can also provide additional information related to training information, injury risk factors and the demand placed on the body, such as surface, footwear, travel time and type of activity (indoor/outdoor training session, friendly/competitive match or team/individual gym session) (O'Connor et al., 2016b). Training diaries that measure sleep duration provide additional information regarding recovery and fatigue. Weekly training diaries have been reported to be significantly accurate for athletes recalling training history ($r>0.73$; $P<0.05$) (Baker et al., 2003). Face and convergent validity of the self-recall training diary was confirmed in collegiate Gaelic footballers for training intensity ($r=0.67$; $P<0.001$) and duration ($r=0.82$; $P<0.001$) when compared to a combined wearable camera device and accelerometer (O'Connor et al., 2016b). Validity of training information was also identified when comparing categorical training information variables to camera and accelerometer data ($\kappa=0.91$-1.00; $P<0.001$) (O'Connor et al., 2016b). However, compliance, error and bias can affect accuracy of the data (O'Connor et al., 2016b; Hopkins, 1991).

2.4.2. Summary of Load Monitoring in Adolescents

Monitoring load is key to assess if Gaelic footballers are optimally adapting to their applied load and minimising the risk of injury. The current load monitoring research in Gaelic football has focused on elite adult players but there is currently no available research examining internal load monitoring in adolescent Gaelic footballers. Therefore, a prospective examination of internal load and its association with injury is evidently

required in adolescent Gaelic footballers to equip coaches and sports medicine clinicians with the necessary knowledge to elicit performance enhancing effects with training, while also minimising injury risk.

2.5 Mental Health and the Psychological Response to Musculoskeletal Injury

Sport and physical activity participation can have a positive influence on mental health (Breslin et al., 2017a; Stanton and Reaburn, 2014; Hamer et al., 2009; Daley, 2008). The World Health Organisation defines mental health as more than simply the absence of illness but also a state of well-being, where each individual realises their own potential, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to their own community (World Health Organisation, 2018). Mental health in athletes has further been defined as a state of well-being, in which those involved in competitive sport realise their purpose and potential, can cope with competitive sport demands and normal life stressors, work productively and fruitfully, act autonomously according to their personal values, are able to make a contribution to their community and feel they can seek support when required (Breslin et al., 2019b).

With sports participation, athletes are subjected to intense physical and mental demands (Rice et al., 2016), which may increase their risk of experiencing mental health issues (Lopez and Levy, 2013; Hughes and Leavey 2012; Reardon and Factor 2010). Differences exist in the experience of mental health issues between team and individual sports participants. Athletes competing in individual sports report greater levels of anxiety or depression than athletes involved with team sports (Pluhar et al., 2019; Nixdorf et al., 2016). Athletes must possess unique psychological qualities in order to adapt to setbacks and be able to withstand the pressures associated with playing sport (Sarkar and Fletcher, 2014). Everyday stressors indicative of non-sporting life events (Sarkar and Fletcher, 2014; Fletcher et al., 2006), such as relationship problems, family issues, academic commitments, financial pressures, death of a significant other, career development or work-life balance (Sarkar and Fletcher, 2014; McKay et al., 2008; Thelwell et al., 2007), can initiate mental health issues in athletes. Additional competitive and organisational stressors (Sarkar and Fletcher, 2014) can increase symptoms of a mental health issue. Athletes face unwavering internal (self-pressure as a result of external demands) and

external expectations (pressure on athlete from external sources) (Sarkar and Fletcher, 2014) to perform well competitively and to please coaches, teammates, family and supporters (Rice et al., 2016; Sarkar and Fletcher, 2014).

The unique social context of the GAA in Ireland and the large role the sports play in Irish communities can add to the pressures experienced by Gaelic players (Ipsos MRBI, 2016). Members of the community commonly place value and trust in Gaelic players and recognise them as community ambassadors (Kelly et al., 2018; Gaelic Players Association, 2017). Gaelic players can be perceived as leaders (Gaelic Players Association, 2017) and young people often idolise the more senior and elite sportspeople and consider them as significant role-models. These added expectations from the community may place excessive and undue pressure on Gaelic players. In addition, elite athletes face intense public and media scrutiny and continually face pressure to compete to a high standard (Rice et al., 2016). Elite Gaelic players can face additional challenges associated with the duration of travel time to and from training and competitions as players are required to compete where they are originally from and thus, players residing outside their home county, due to work or college, face an average of three hours travel to and from pitch-based sessions (Kelly et al., 2018). Excessive travel times can directly or indirectly result in reduced sleep and recovery, increasing the chance of suboptimal performance and risk of injury (Kelly et al., 2018), therefore, adding to the mental health issue that may be experienced.

The experience of a sport-related injury is as an additional major life stressor that can increase the risk of mental health issues in athletes (Rice et al., 2016; Gulliver et al., 2015; Sarkar and Fletcher, 2014; Nixdorf et al., 2013; Ardern et al., 2013; Walker et al., 2007). As identified in Section 2.3, injuries are common in youth and adult Gaelic footballers and therefore, considerations for players mental health post-injury is important. Athletes with a strong athletic identity may experience mental health issues, as an integral aspect of who they are and their sense of identity can become threatened (Green and Weinberg, 2001). Team sport athletes report greater coping strategies post-injury than individual sport athletes (Johnson, 1997), suggested to be due to the presence of shared goals that strengthen cohesion and social support within the team environment (Evans and Eys,

2015). Nonetheless, the psychological response to injury is subjective to each individual (Masten et al., 2014) and may be perceived to be normal or problematic (Putukian, 2016).

An understanding of athletes' psychological responses to injury has been facilitated with the development of the stage model of grief and loss (Kubler-Ross, 1969), integrated model of response to sport injury (Wiese-Bjornstal et al., 1998) and biopsychosocial model of sport injury and rehabilitation (Wiese-Bjornstal, 2010). The stage model of grief and loss details depression, anger, bargaining, denial and acceptance but research suggests limited support for its use when examining the psychological response to injury in athletes as the model was not designed for athletic populations and the phases may not adequately describe injured athletes responses (Evans and Hardy, 1995). The integrated model of response to sport injury (Figure 2.3) and biopsychosocial model of sport injury and rehabilitation (Figure 2.4) provide a more comprehensive examination of individual differences and suggest a reciprocal and cyclical relationship between cognitive appraisal and emotional and behavioural responses (Wiese-Bjornstal, 2010; Wiese-Bjornstal et al., 1998).

The integrated model of response to sport injury theorises an athlete's cognitive appraisal of their injury situation is affected by a range of personal and situational factors, such as injury severity and time-loss duration (Wiese-Bjornstal et al., 1998). In particular, more severely injured athletes experience greater post-injury mood disturbances than those with an acute or moderate injury (Masten et al., 2014). Cognitive appraisal can, in turn, influence the athlete's behavioural and emotional responses to injury (Wiese-Bjornstal et al., 1998). Adding to the integrated model of response to sport injury, the biopsychosocial model of sport injury and rehabilitation details that cognitive, affective and behavioural responses can affect the outcome or response to sport injury and rehabilitation (Wiese-Bjornstal, 2010). Key to understanding the psychological response to injury is recognition that these processes are inter-related, cyclical, dynamic and recursive in their influences on each other (Wiese-Bjornstal, 2010).

Psychological responses, such as depression, anxiety, tension, low self-esteem, substance use or abuse, disordered eating and suicidal ideation (Chan et al., 2016; Putukian, 2016) may be evident post-injury and during rehabilitation (Ardern et al., 2013). Injured athletes

report greater depressive and generalised anxiety symptoms than non-injured athletes (Gulliver et al., 2015; Appaneal et al., 2009; Brewer and Petrie 1995; Leddy et al. 1994) and concern is warranted with persistent, worsening or excessive symptoms of a mental health issue (Putukian, 2016). Athletes under 18 years have an increased risk of experiencing injury-related mental health issues, with the symptoms varying based on age and developmental status (Birmaher et al., 1998). Mood disturbances, especially fear and anxiety, are commonly observed cognitive appraisals of injury situations for adolescents (Clement et al., 2013). However, there is a current dearth of research examining the psychological response to injury in adolescent Gaelic footballers.

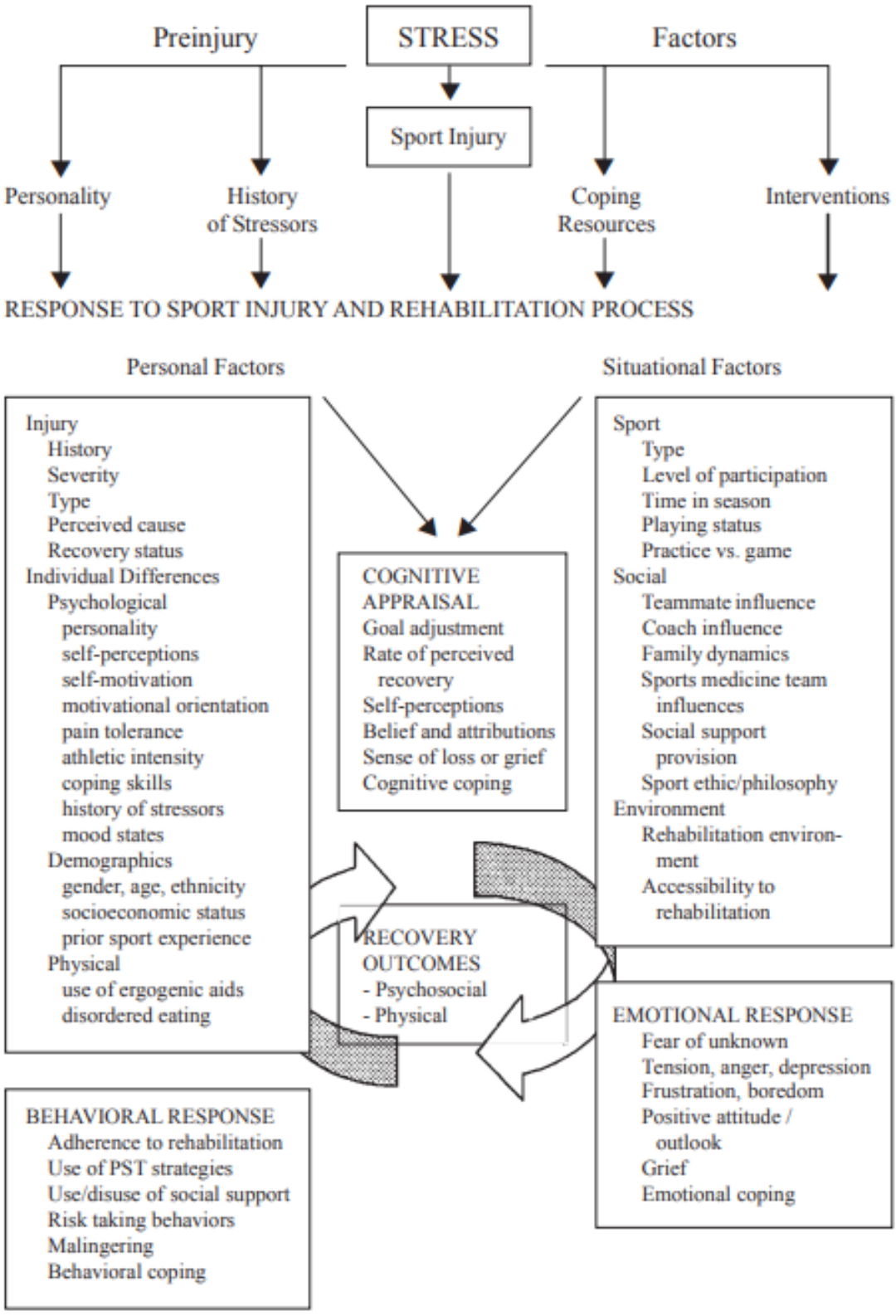

Figure 2.3 Integrated model of response to sport injury (Wiese-Bjornstal et al., 1998)

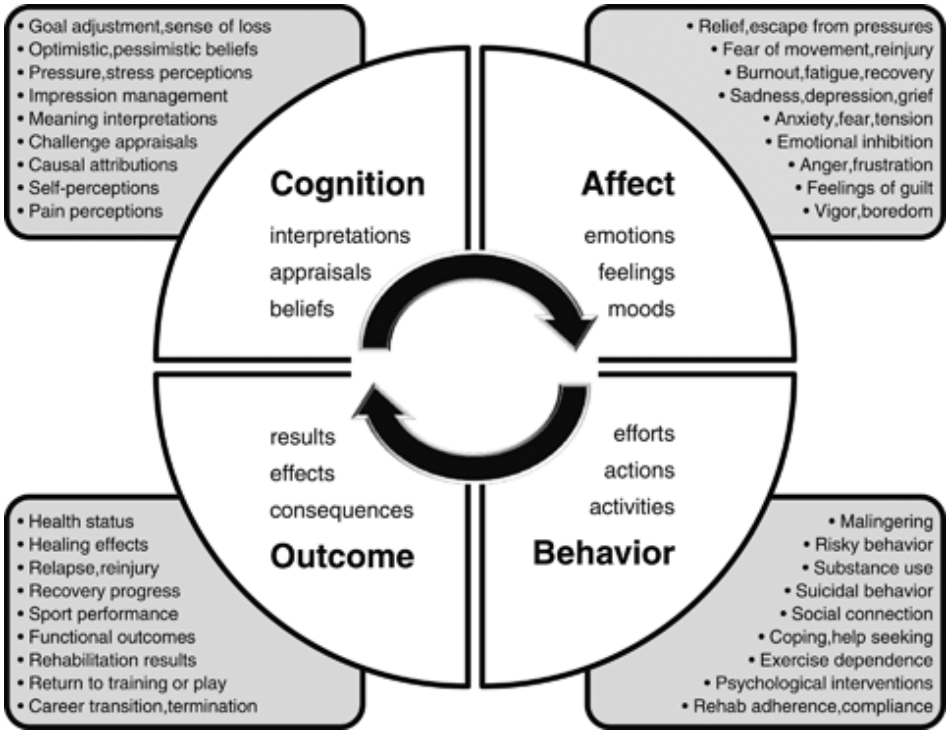

Figure 2.4 Biopsychosocial model of sport injury and rehabilitation (Wiese-Bjornstal, 2010)

2.5.1. Assessing the Psychological Response to Musculoskeletal Injury

Diagnostic criterion measures are utilised in clinical practice to distinguish between those with mental disorder and non-disorder (Moesch et al., 2018), including the Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-V) (American Psychiatric Association, 2013) and International Statistical Classification of Diseases and Related Health Problems – Tenth Revision (ICD-10) (World Health Organization, 2016). However, the minimal threshold between clinical and sub-clinical conditions (Moesch et al., 2018), multidirectional nature of mental health issues and lack of clear definition of mental disorder (Clark et al., 2017) make it difficult for straight-forward and simplistic diagnosis of mental health issues. Sports medicine clinicians (i.e., athletic therapists, physiotherapists, physicians) must recognise when an athlete is experiencing a clinical condition and in need of referral to an appropriate professional. However, an athlete may not meet the criteria for a formal diagnosis but may still experience sub-clinical conditions that negatively impact rehabilitation and the post-injury response, where early intervention may be helpful (Roberts et al., 2016). Thus, additional assessment tools that provide an accurate and effective assessment of athletes is necessary to identify those

with psychological issues following musculoskeletal injury. A number of questionnaires are currently available to examine negative psychosocial responses post-injury, including the Fear-Avoidance Beliefs Questionnaire, Fear of Pain Questionnaire, Pain Catastrophizing Scale, Profile of Mood States and Athlete Fear-Avoidance Questionnaire.

2.5.1.1. Fear-Avoidance Beliefs Questionnaire

The Fear-Avoidance Beliefs Questionnaire (FABQ) (Appendix B) is a 16-item measure used to assess an individual's beliefs toward physical activity and work and how these affect their lower back pain (Waddell et al., 1993). Items are rated on a 7-point scale ranging from 0 (completely disagree) to 6 (completely agree). Total scores range from 0 to 96, with higher scores indicating greater fear-avoidance beliefs. The questionnaire was developed for those experiencing back pain and work-related injuries and is based on theories of fear and avoidance behaviour (Waddell et al., 1993). FABQ has not been validated for use in a physically active cohort and is therefore, only applicable for use in those with lower back pain in the context of work-related pain.

2.5.1.2. Fear of Pain Questionnaire

The third version of the Fear of Pain Questionnaire (FPQ-III) (Appendix C) is a 30-item measure used as a screening tool to assess fear of pain related to specific painful stimuli (McNeil and Rainwater, 1998). Items are rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (extreme), with a higher sum of scores indicating greater fear. FPQ-III was found to have good internal consistency (α=0.87-0.92) and test-retest reliability (ICC=0.69-0.76) when assessed in collegiate students (N=275) (McNeil and Rainwater, 1998). However, FPQ-III contains items that are non-sports specific, which reduces its ability to determine fear or anxiety related to physical activity related injury.

2.5.1.3. Pain Catastrophizing Scale

The Pain Catastrophizing Scale (PCS) (Appendix D) is a 13-item measure designed to assess different perspectives of catastrophizing and thoughts or feelings while experiencing pain (Sullivan et al., 1995). Catastrophizing is defined as the cognitive element of the fear network, where the anxious athlete focuses on the most extreme negative consequences conceivable with pain interpreted as being extremely threatening (Leeuw et al., 2007). The scale is composed of three main components: rumination (worry or pain thoughts), magnification (exaggeration of the unpleasantness of pain situations)

and helplessness (feelings of inability to deal with painful situations). Items are rated using a 5-point Likert scale ranging from 0 (not at all) to 4 (all the time) and total scores range from 0 to 52. Higher scores indicate greater catastrophizing, which signify more intense pain and more severe depression and anxiety (Sullivan et al. 1995). Adequate internal consistency has been shown for the scale (α=0.87) and subscales (α=0.66-0.87) (Sullivan et al., 1995).

PCS was shown to be internally consistent for both athletic (α=0.54-0.84) and sedentary individuals (α=0.65-0.89) (Sullivan et al., 2000), which supports its use in individuals who experience pain following a sporting injury. PCS was also implemented with a cold-water immersion task, with the athletic group reporting less pain (5.7±1.6) and lower PCS scores (17.1±7.3) than the sedentary group (7.0±1.7; 20.0±9.1) (Sullivan et al., 2000). In addition, PCS total scores significantly correlated with pain ratings in the sedentary ($r=0.43$; $P<0.01$) and athletic sample ($r=0.30$; $P<0.05$) (Sullivan et al., 2000), which suggest catastrophizing is a significant predictor of pain in athletes. Although PCS was not developed for use in a sporting cohort, Sullivan et al. (2000) demonstrated its appropriateness for use in an athletic population. However, solely examining catastrophizing should be questioned. Many factors can place added pressure on an individual following injury, such as fear of re-injury, negative affect (e.g. anxiety, fear, anger) (Tripp et al., 2007), self-confidence and self-efficacy (Feltz and Oncu, 2014) and an athlete's cognitive appraisal and unique behavioural and emotional post-injury responses (Wiese-Bjornstal et al., 1998). Therefore, a more holistic approach, which examines the effect of each of these elements on an individual's psychological thought process following injury is necessary.

2.5.1.4. Profile of Mood States

The Profile of Mood States (POMS) was designed to assess total mood disturbance (McNair, 1971). The original POMS questionnaire was made up of 65 items but a modified short-form POMS was developed with 37-items (Appendix E) (Shacham, 1983). Items are rated on a 5-point Likert scale, ranging from 0 (not at all) to 4 (extremely), with higher scores indicating negative mood with low vigour, while lower scores represent less negative moods and high vigour. The POMS is made up of six different sub-scales; tension-anxiety, depression-dejection, anger-hostility, vigour-

activity, fatigue-inertia and confusion-bewilderment, where a combination of all subscale scores provides a value for total mood disturbance. POMS requires 3 to 5 minutes to complete in full but may require extra time in different populations (Berger and Motl, 2000).

The measure was designed for use in clinical populations but has been used to assess the emotional response of athletes to injury (Turner et al., 2017; Mainwaring et al., 2010; Van Wilgen et al., 2010). POMS has been shown to have excellent internal consistency (α=0.84-0.95) (Leunes and Burger, 2000). The effect of injury on POMS scores was investigated in injured athletes twice a week for four weeks, with the greatest total mood disturbance scores evident 24 hours after injury, which decreased in the subsequent four weeks (McDonald and Hardy, 1990). Further research has shown significant correlations between POMS subscales and athletic injury in collegiate football and rugby players (Lavallee and Flint, 1996). Tension/anxiety were related to injury frequency ($r=0.30$; $P<0.05$) and tension/anxiety ($r=0.44$; $P<0.05$), anger/hostility ($r=0.30$; $P<0.05$) and total negative mood state ($r=0.28$; $P<0.05$) correlated with injury severity (Lavallee and Flint, 1996). Despite the wide use of POMS in athletes, the questionnaire was originally designed for use in clinical populations (Berger and Motl, 2000). Therefore, the applicability of all subscales of the questionnaire to injured athletes is questionable.

2.5.1.5. Athlete Fear-Avoidance Questionnaire

The Athlete Fear-Avoidance Questionnaire (AFAQ) (Appendix F) is a 10-item measure designed to assess fear-avoidance or the fear of pain in athletes (Dover and Amar, 2015). Items are rated using a 5-point Likert scale, ranging from 1 (not at all) to 5 (completely agree). Total scores range from 10 to 50 and higher scores indicate greater fear-avoidance. The measure was designed specifically for athletes, who are viewed as a specific sub-set of the population that are exposed to pain and sports injuries in the context of their activity and have different mental traits to the general population (Dover and Amar, 2015). A modified Delphi technique was utilised to develop the questionnaire, with eight experts in the fields of athletic therapy, sport psychology and fear-avoidance contributing. Potential additions for the questionnaire based on the fear-avoidance model (FAM) were deliberated among the experts and a 30-item questionnaire was developed. Each part of the questionnaire was rated by the experts and reduced to 26 items. A V-coefficient rating

system, a statistical method developed to analyse data from validity judgements or ratings (Aiken, 1985), was used to further critique the items. Any item which did not meet the V-coefficient value was removed leaving a resulting 11 items. One further item, which would have required a different rating scale, was removed.

Validity of the questionnaire was subsequently examined in injured and uninjured athletes (N=99) and high internal consistency was established (α=0.81) (Dover and Amar, 2015). Concurrent validity was examined between the AFAQ, PCS and FABQ and a significant moderate correlation was evident between AFAQ and PCS ($r=0.59$; $P<0.05$). Weak and moderate correlations were evident between the AFAQ and FABQ-Total ($r=0.28$; $P<0.05$) and AFAQ and FABQ-PA ($r=0.35$; $P<0.05$) (Dover and Amar, 2015). No significant correlations were found between the AFAQ and FABQ-Work ($P>0.05$) indicating that the work related items on the scale are not applicable to athletes (Dover and Amar, 2015). The AFAQ significantly correlates with the PCS and FABQ, two existing validated assessment tools of catastrophizing and fear-avoidance beliefs and is, therefore, a valid tool in measuring fear-avoidance as a psychological response to injury in athletes. The questionnaire contains 10 items and may be administered efficiently in a short period of time.

2.5.2. Assessing Confidence as a Psychological Response following Musculoskeletal Injury

Injury can initiate a loss of confidence, which may be attributed to time away from sport and the team, perceived loss of fitness and athletic skill, a need for surgery or a fear of losing their place on the team (Smith and Milliner, 1994), highlighting the importance of confidence assessment and readiness to return to play following injury. A number of measures are currently utilised to examine confidence, including the Trait Sport Confidence Inventory, State Sport Confidence Inventory, Tampa Scale for Kinesiophobia and Injury Psychological Readiness to Return to Sport.

2.5.2.1. Trait Sport Confidence Inventory and State Sport Confidence Inventory

The Trait Sport Confidence Inventory (TSCI) (Vealey, 1986) (Appendix G) and State Sport Confidence Inventory (SSCI) (Vealey, 1986) (Appendix H) are utilised to examine athletes' confidence when competing in sport. Sport Confidence-Trait defines the "belief

or degree of certainty individuals usually possess about their ability to be successful in sport" whereas Sport Confidence-State defines the "belief or degree of certainty individuals possess at one particular moment about their ability to be successful in sport" (Vealey, 1986, p.223). Therefore, the TSCI can be issued at any time whereas the SSCI is issued to assess confidence in one particular situation. TSCI and SSCI are suggested to be used when measuring psychological readiness to return to sport (Tassignon et al., 2019). TSCI and SSCI are 13-item measures, with items rated on a 9-point Likert scale, ranging from 1 (low) to 9 (high). Total scores can range from 13 to 117, with higher scores indicating greater confidence.

The measures were developed with 21 items suggested for TSCI and 19 items for SSCI and were reviewed by four sports psychologists to determine the content validity of each item as well as clarity of sentence structure. Sixteen items were retained for TSCI and 15 for SSCI (Vealey, 1986). Excellent internal consistency was shown for the TSCI (α=0.93) and SSCI (α=0.95) in high-school (N=103; M=16.2 years) and collegiate athletes (N=96; M=19.8 years) (Vealey, 1986). Test-retest reliability for the TSCI at 1 day (r=0.86; P<0.05), 1 week (r=0.89; P<0.05) and 1 month (r=0.83; P<0.05) was shown in high-school (N=109; M=17.1 years) and collegiate samples (N=110; M=20.4 years) (Vealey, 1986). It is not appropriate to assess test-retest reliability in the SSCI as the questionnaire measures confidence at one particular moment or certain situation. Concurrent validity of TSCI and SSCI in predicting responses to related personality constructs was examined. TSCI was moderately correlated with SSCI (r=0.64; P<0.05), while SSCI was moderately negatively correlated with cognitive (r=-0.50; P<0.05) and somatic competitive A-state (r=-0.33; P<0.05) (Vealey, 1986). However, TSCI and SSCI are general personality trait assessments that do not take sport-specific situations, like injury, into account (Glazer, 2009). In addition, utilisation of these scales in physically active populations is disputed as they are not sport specific and have no items relating specifically to athletes. Athletes are also asked to rate their confidence in comparison to the athlete or sportsperson they deem to be most confident. As this can range from a peer, a teammate or a professional athlete, the athlete's score can range from high to low depending on the athlete chosen, making it difficult for the clinician to determine if the athlete is ready to return to play (Glazer, 2009).

2.5.2.2. Tampa Scale for Kinesiophobia

The Tampa Scale for Kinesiophobia (TSK) (Appendix I) is a 17-item measure used to assess the subjective rating of kinesiophobia or fear of movement (Miller et al., 1991). Kinesiophobia is defined as an excessive, irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or re-injury (Kori et al., 1990). Items are rated using a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) and a total score is achieved by summing all items, with items 4, 8, 12 and 16 reverse scored. Higher scores indicate greater kinesiophobia. Good internal consistency of the questionnaire was reported in a general population sample with chronic low back pain (N=103) (α=0.77) (Vlaeyen et al., 1995). Tripp et al. (2007) examined male and female recreational athletes returning to sport post anterior cruciate ligament (ACL) reconstruction (N=49; M=29.2±11.5 years) and found mean TSK scores were 27.7±10.4 (range=12-51), with higher values corresponding to greater fear of re-injury (Tripp et al. 2007). Good internal consistency of the TSK was shown in this athletic sample (α=0.88), indicating the validity of the scale in measuring levels of kinesiophobia in those who are physically active (Tripp et al., 2007). TSK is also a significant predictor of confidence in return to sport and activity ($r=0.60$; $P<0.05$) (Tripp et al., 2007). Overall, the findings show that athletes' confidence in returning to their sport was reduced in those with greater negative mood and that greater fear of re-injury was related to lower levels of return to sporting activity (Tripp et al., 2007). Despite the previous use of the questionnaire in an athletic sample and its proven validity, the questionnaire was not developed primarily for use in athletes and could possibly over or under-estimate levels of kinesiophobia and confidence following return to play.

2.5.2.3. Injury Psychological Readiness to Return to Sport

The Injury Psychological Readiness to Return to Sport (IPRRS) (Appendix J) is a 6-item measure used to assess confidence when returning to play following injury (Glazer, 2009). Items are rated from 0 (no confidence at all) to 100 (complete confidence) and a total score is calculated by summing the scores and dividing by 10. The maximum score that can be achieved is 60, which indicates the athlete is psychologically ready to return to sport. Any score below 50 deems the athlete to have moderate to low confidence and is not ready to return to play. The questionnaire was developed with seven experts in the areas of athletic injuries and sports psychology using the Delphi technique. Twenty-two

items measuring psychological readiness were suggested for the scale and subsequently, items deemed too specific to an individual sport or environment or not appropriate for return to play athletes were eliminated, leaving a 10-point scale. Each item was re-evaluated and analysed using the V-coefficient rating system (Aiken, 1985). Four items did not meet the V-coefficient value of ≥0.75 and were subsequently removed, leaving a 6-item measure.

Validity of the scale was assessed in collegiate athletes (N=22; M=19.7±1.4 years). Each participant completed the IPRSS scale and POMS (short form) on four different occasions: within one day of their injury, after missing one week of practice, one day prior to return to competition and one day after that first competition. The athletic trainer also completed the scale one day before and after the first competition, rating their opinion on the psychological readiness of the athlete to return to play and to determine if the athletes were rating themselves honestly. An inherent issue with self-report scales is that the respondents may not answer truthfully and their answers may be biased (Thomas et al., 2005) but involvement of the athletic trainer may minimise this bias. Athlete IPRRS scores were lowest after injury (31.7±15.7), increased before practice (45.3±9.6), increased again before competition (54.3±3.8) and remained the same after competition (53.9±3.5) (Glazer, 2009). The results showed the IPRRS scores were negatively correlated with POMS at all 4 time points, which highlights concurrent validity ($r=-0.78$ to -0.57; $P<0.05$) (Glazer, 2009). POMS was correlated with IPRSS because depressed mood states are linked with low self-efficacy (Comunian, 1989; Bandura, 1982; Bandura, 1977) and the POMS is one of the primary scales used in quantifying the emotional response to injury (Smith et al., 1990). The IPRRS, when completed by the athlete and the athletic trainer, was positively correlated before and after practice, highlighting external validity. Therefore, the IPRRS is a valid and reliable measure of confidence in athletes returning to play following injury.

2.5.3. Summary of Mental Health and the Psychological Response to Musculoskeletal Injury

Sport and physical activity participation can positively influence mental health but athletes can also be subjected to intense physical and mental demands, which may increase their risk of experiencing mental health issues. Injury is a noteworthy stressor

that can initiate or exacerbate the symptoms of a mental health issue. There is a currently no available research examining the psychological response to injury in adolescent Gaelic footballers, despite young athletes having an increased risk of experiencing injury-related mental health issues (Birmaher et al., 1998) and mood disturbances (Clement et al., 2013). The lack of available literature highlights the need for a greater understanding of the psychological response to injury in adolescent Gaelic footballers, which may facilitate holistic physical and psychological rehabilitation.

2.6 Mental Health and Help-Seeking

Mental health issues are prevalent among 15 to 34 year olds in Ireland with 20.0% to 25.0% experiencing symptoms of a mental health issue (Ipsos MRBI, 2016). The peak onset of mental health issues is during late adolescence and early adulthood (Rice et al., 2016), which coincides with the main years of Gaelic football participation (O'Connor et al., 2017; O'Connor et al., 2016a; Murphy et al., 2012; Newell et al., 2006; Cromwell et al., 2000). Therefore, despite the risk of injury in adolescent Gaelic footballers, understanding mental health issues in young adult Gaelic footballers is important. Injury can initiate or exacerbate symptoms of a mental health issue (Rice et al., 2016), with elite Gaelic athletes with a history of one or more severe injuries during their career significantly more likely to experience mental health issues (RR=3.4) and anxiety/depression (RR=3.1) ($P<0.05$) (Gouttebarge et al., 2016). However, there is a current disparity between the prevalence of mental health issues and help-seeking (Rickwood and Thomas, 2012).

Help-seeking refers to an adaptive coping process, where an individual attempts to obtain external assistance to deal with a mental health issue (Rickwood and Thomas, 2012). The type of help provided can be instrumental (transport or financial assistance), informational (health-related information or referrals), affiliative (peer support), emotional (emotional wellbeing support) or actual treatment (Rickwood and Thomas, 2012). Assistance may be formal and come from those tasked with a specialised role in providing assistance, advice, support and treatment (Rickwood and Thomas, 2012), including mental health professionals (counsellor, psychologist, psychiatrist, sport psychology consultant) or primary health care providers (GP, physician, social worker,

mental health nurse) (Moreland et al., 2018; Rickwood and Thomas, 2012; Nicholas et al., 2004). Informal or semi-informal help can come from the immediate lay support network, including peers, parents, family or teammates and is the preferred source of help in those with mental health issues (Wilson et al., 2005b; Oliver et al., 2005; Biddle et al., 2004). Young people experiencing a mental health issue (N=198; M=17.4 years), generally seek help from their social support network (60.1%), as opposed to professional help sources (17.2%) (Rickwood and Braithwaite, 1994). Athletes report a noted reluctance to seeking help from a counsellor when compared to non-athletes (Watson, 2005). The preference for informal help-seeking is suggested to be due to the personal and not professional relationship evident (Rickwood and Thomas, 2012) and the less threatening and casual nature of informal help-seeking sources (Raviv et al., 2000). However, caution is warranted with informal supports who may be untrained, inexperienced and liable to make a mistake (Hughes et al., 2018) and may lack the knowledge and appropriate awareness in providing helpful responses for difficult issues (Rickwood et al., 2005).

A novel and alternative more recent approach to help-seeking is self-help, where those with a mental health issue utilise online resources to seek assistance (Rickwood and Thomas, 2012). Online resources may be preferred due to the anonymity (Rickwood et al., 2005), convenience and lack of cost (Griffiths and Christensen, 2006) associated with their use. Irish collegiate students (aged 18 to 24 years) have searched the internet for health information (66.1%) (Horgan and Sweeney, 2012), accessed online mental health information and support (30.8%) and indicated they would use online services in the future if required (68.0%) (Horgan and Sweeney, 2010). Online help-seeking may be even greater in current society due to increases in internet access in the home, with the Central Statistics Office in 2010 reporting 72.0% of Irish households have internet access, which increased to 89.0% in 2018 (Central Statistics Office, 2018). The Covid-19 pandemic and requirements for social distancing accelerated the use of technology in mental health care (Figueroa and Aguilera, 2020), which may ignite the popularity of telehealth and e-mental health resources as help-seeking tools into the future. While face-to-face help-seeking is preferred in student-athletes, online help-seeking is valued and may be a useful help-seeking approach, particularly with an increase in awareness of its benefits (Bird et al., 2018).

Despite varying avenues for help-seeking, few elite athletes seek professional psychological help (Gorczynski et al., 2019), with the reluctance to seek help acknowledged as one of the greatest obstacles in efficient management of mental health issues (Rickwood and Thomas, 2012). Efficient help-seeking behaviours are vital for mental health and wellbeing (Rickwood et al., 2005) and encouraging athlete help-seeking is an important preventive and treatment strategy (Uphill et al., 2016). Untreated mental health issues can impact athletic performance (Hainline and Reardon, 2019) and interfere with personal relationships and decrease social engagement (Chan et al., 2016). Therefore, a greater understanding of factors impacting help-seeking is essential.

2.6.1. Help-Seeking Theories and Models

Help-seeking has garnered substantial research attention and in order to have a better understanding, mental health help-seeking must have a theoretical foundation (Kauer et al., 2017) and be conceptualised using existing theories. This literature review will focus on the Self-Determination Theory, Help-Seeking Model, Health Belief Model and Theory of Planned Behaviour.

2.6.1.1. Self-Determination Theory

The Self-Determination Theory (SDT) is a theory of human motivation utilised to predict psychological wellbeing and details three universal psychological needs essential for functioning; autonomy, competence and relatedness (Ryan and Deci, 2000). Autonomy is related to an individual's self-control of their situation, competence details their ability to managing cognitive and emotional responses and relatedness explains an individual's perception of belonging in a social context (Ryan and Deci, 2000). Social environments may play a role in supporting or preventing these three psychological needs highlighted by SDT, which subsequently can alter autonomous motivation, health behaviours and health-related outcomes (Ryan and Deci, 2017).

SDT has recently been utilised as the theoretical basis for a wellbeing intervention in athletes (Shannon et al., 2019). The findings indicated a mindfulness-based mental health intervention may effectively reduce stress and promote wellbeing when an emphasis is placed on competence-promoting processes within the intervention (Shannon et al., 2019). SDT has also been used to conceptualise motivation to seek help online for mental

health difficulties in young people (Pretorius et al., 2019). Online resources may provide autonomy when seeking help but help-seeking may continue to be challenged when a multitude and variety of information is presented and competence to seek help is reduced (Pretorius et al., 2019). Lack of MHL may be viewed as an additional issue of competence but by addressing and improving competence, motivation to seek help may be increased (Pretorius et al., 2019). Interventions underpinned by SDT should also consider the importance of connecting and engaging with others and sharing the help-seeking stories of similar individuals, which may improve relatedness, while also improving MHL (Pretorius et al., 2019).

A key strength of SDT is its ability to examine broad factors influencing motivation and its applicability to various cultures and life domains (Deci and Ryan, 2008). However, the theory is limited by its assumption that all individuals have the willingness to develop the inherent motivation to complete a task or behaviour (Vansteenkiste and Sheldon, 2006). In addition, in order to support autonomy, an individual must be uncontrolled and the choice and motivation to complete a behaviour must be made solely by the individual (Ryan and Deci, 2000). Therefore, barriers outside of the individuals control cannot support autonomy and self-determination is limited.

2.6.1.2. Help-Seeking Model

Seeking help is an essential first step for improving mental health and accessing necessary care and thus, the help-seeking model was developed specifically to address mental health help-seeking in young people (Rickwood et al., 2005). The model conceptualises help-seeking as a four-stage process; awareness of symptoms and an appraisal that help may be required, expression of symptoms and a need for support, awareness and availability of sources of help and willingness to seek out and disclose to sources (Rickwood et al., 2005). With the development of the model, the importance of progressing communications from personal (internal world of thoughts and feelings) to interpersonal (social relationships) was highlighted (Rickwood et al., 2005). In particular, it was emphasised that help-seeking relates to the process of actively seeking out and utilising social relationships that are formal or informal in order to help deal with personal problems (Rickwood et al., 2005). The model postulates young people engaging in help-seeking behaviours may have lower levels of mental ill-health (Rickwood et al., 2005).

However, help-seeking may not simply be a process of identifying a need for help, deciding to seek help and carrying out that decision, with barriers possibly intervening at any stage of the process to prevent help-seeking (Rickwood et al., 2005).

Comprehensive use of the model to conceptualise and examine help-seeking is lacking. However, mental health help-seeking interventions implemented in athletes were designed to focus on one or more of the stages of the model (Gulliver et al., 2012b). The interventions specifically provided information related to MHL and reducing stigma, feedback about symptoms or help-seeking resources but did not significantly change help-seeking attitudes, intentions or behaviours (Gulliver et al., 2012b). A key strength of the model is its specificity in addressing and conceptualising mental health help-seeking in athletes (Kauer et al., 2017). However, the stages of the model do not specifically address the existence of barriers to help-seeking and assume athletes' readiness to seek help (Kauer et al., 2017).

2.6.1.3. Health Belief Model

The Health Belief Model (HBM) (Rosenstock, 1966) attempts to understand and explain why individuals engage or fail to engage with proactive health behaviours. HBM assumes health behaviour is related to four key factors; perceived susceptibility, severity, barriers and benefits (Rosenstock, 1966). Perceived susceptibility outlines that an individual will seek help if they believe they are vulnerable to a negative health outcome, while perceived severity explains help-seeking is dependent upon an individual's evaluation and perception of the seriousness of the problems they are experiencing. Perceived barriers relates to the factors believed to inhibit appropriate treatment and perceived benefits are the positives an individual may associate with engaging with treatment. The model also accounts for cues to action, believed to be internal or external triggering mechanisms that can initiate help-seeking behaviours (Rosenstock, 1966). Self-efficacy is an additional concept later added to the model (Rosenstock et al., 1988) and refers to an individual's belief that they can overcome the problem they are experiencing. Modifying factors, including age, gender, education, ethnicity, personality or socioeconomic status, which are subjective to each individual, can influence perceived susceptibility, seriousness, barriers and benefits (Champion and Skinner, 2008) and should be considered when examining help-seeking. Help-seeking may be more likely when perceived susceptibility

and seriousness are high, benefits outweigh the barriers and an individual believes they can overcome their problems (Rosenstock, 1966).

HBM was suggested to be appropriate in mental health care when examining help-seeking (Henshaw and Freedman-Doan, 2009) and was shown to be useful to predict intentions to seek help for mental health issues in collegiate students (Kim and Zane, 2016; O'Connor et al., 2014). There is currently only one known study examining HBM and mental health help-seeking in athletes (Bird et al., 2020), with findings indicating support for HBM in conceptualising help-seeking in athletes. In particular, athletes acknowledged their perceived susceptibility to experiencing mental health issues and the seriousness of those issues in influencing daily function (Bird et al., 2020). Perceived barriers of engaging with help were evident but a number of perceived benefits and cues to action to facilitate help-seeking were acknowledged (Bird et al., 2020). The importance of self-efficacy was also highlighted (Bird et al., 2020).

By examining perceptions, barriers and benefits of help-seeking, appropriate interventions can be designed to help individuals engage with the appropriate services (Henshaw and Freedman-Doan, 2009), which can be considered a key strength of HBM. In addition, the model considers both barriers and benefits as opposing factors to seeking help, accounting for the dynamic nature of the decision-making process (Henshaw and Freedman-Doan, 2009). HBM also couples perceived susceptibility and seriousness, which may be viewed as an additional strength of the model as other models may conceptualise the threat of experiencing an issue alone (Champion and Skinner, 2008). However, despite the benefits of HBM, it is associated with a number of limitations. Help-seeking is complex and other factors not accounted for in HBM may influence help-seeking behaviours (Bird et al., 2020). The model is also assumed to have poor predictive abilities (Carpenter, 2010), specifically when predicting long-term health-related behaviours (Henshaw and Freedman-Doan, 2009). In particular, it may fail to distinguish between initiating treatment and attending one help-seeking appointment versus adhering to and completing a full course of necessary treatment (Henshaw and Freedman-Doan, 2009). The model also does not consider the emotional component of behaviour and thus, simply acts as a cognitively based model (Champion and Skinner, 2008).

2.6.1.4. Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) was designed to predict intentions to engage in a specific behaviour (Ajzen, 1985). TPB evolved from the Theory of Reasoned Action (TRA), which suggested an individual's behavioural intentions are influenced by attitudes toward the behaviour and subjective social norms (Fishbein and Ajzen, 1975). Attitudes refers to an individual's perception of performing the behaviour, while subjective social norms relates to whether other people will approve of the behaviour (Fishbein and Ajzen, 1975). However, TRA failed to account for the translation of intentions to actual engaging behaviours and thus, perceived behavioural control was added to the model, now referred to as TPB (Ajzen, 1985). Perceived behavioural control details an individual's perception of the ease or difficulty in performing the behaviour (Ajzen, 1985). Intentions are perceived as the immediate precursor of behaviour but the association between intentions and behaviours indicates factors influencing and determining intentions may also be acknowledged as determinants of behaviour (Fishbein and Ajzen, 1975). Attitudes to seeking help may be improved through increased knowledge of help-seeking, in addition to changing subjective norms, with a particular focus on reducing the stigma associated with mental health issues and improving MHL (Kauer et al., 2017). These changes may lead to intentions to seek help and thus, help-seeking behaviours may be initiated (Kauer et al., 2017; Ajzen, 1991).

TPB has been utilised to examine many areas of health promotion relating to behaviour change within sport (e.g. exercise participation, rehabilitation adherence, doping, concussion management etc.). However, use of the theory to examine and conceptualise mental health in sports settings is limited, with only one available study to our knowledge utilising TPB when implementing a mental health awareness programme in a sporting context (Breslin et al., 2017a). The findings indicated improvements in coaches' mental health knowledge and intentions to offer support following participation in a short mental health awareness programme (Breslin et al., 2017a).

TPB does not require a classification of stages and determines the likelihood of seeking help based on attitudes, subjective norms and perceived control (Kauer et al., 2017), which may be perceived as a key strength of the theory. However, the applicability of TPB may be limited as it is not specific to a defined behaviour and the components of the

theory address broad concepts (Kauer et al., 2017). In addition, TPB assumes volitional control (Ajzen, 1991), where the individual has the opportunity and resources to perform the behaviour, regardless of intentions. The theory also assumes the behaviour is the end point of a linear decision-making process (Ajzen, 1991).

There is no universal agreement of which model or theory is best to adequately describe and understand mental health help-seeking, with each model presenting its own unique limitations. However, based on the help-seeking theories and models presented in the current review of literature, the help-seeking model and TPB, have been determined to be most appropriate for exploring and conceptualising help-seeking in Gaelic footballers. Combining the theory and model was seen as an appropriate method for conceptualising mental health help-seeking previously, particularly due to the specificity of the help-seeking model for mental health issues (Kauer et al., 2017), and was deemed to be appropriate in the current research.

2.6.2. Barriers to Help-Seeking

As highlighted in the help-seeking theories and models, professional mental health help-seeking can be inhibited by barriers, defined as internal or external factors that limit the likelihood of seeking help for mental health issues (Calloway et al., 2012). A number of barriers have been reported in the literature to date, including stigma, poor MHL, lack of accessibility, poor social support structures, cultural norms, negative past experiences, perceived issues with the help-provider and subjective need.

2.6.2.1. Stigma

Stigma refers to the belief that an individual will be negatively judged for seeking help by those from whom they seek help, others who are aware they are seeking help or both (Barney et al., 2006). Stigma, the most common barrier to help-seeking in young elite athletes (Gulliver et al., 2012a), can result in an unwillingness to seek help (Barney et al., 2006) and under-recognition and under-treatment of mental health issues (Roness et al., 2005). Self-stigma may also be evident, which refers to negative attitudes and self-perceptions as a result of internalised societal ideas of stigma (Corrigan and Watson, 2002). Stigmatised beliefs can create a perceived need to hide vulnerabilities, avoid being seen as weak and appear independent (Barney et al., 2006; Davies et al., 2000). Athletes report particular concerns about their coaches, teammates, parents and family knowing

their need to seek help (Lopez and Levy, 2013; Gulliver et al., 2012a). The stigma associated with seeking-help is perceived to be greater than the stigma associated with an actual diagnosis of a mental disorder (Vogel et al., 2007a).

Collegiate male athletes stigmatise consulting with a sport psychologist more than female collegiate athletes ($P<0.001$), with women more likely to accept the need for psychological support and be more tolerant to the social stigma of seeking psychological help than men (Martin, 2005). Among a sample of the general population (M=50.9 years; 18-89 years), 20.0% perceive GPs to have the greatest stigmatising beliefs (Barney et al., 2006). Unwillingness to seek help from a GP may limit access to further medical services as an individual's GP is typically the initial contact for referral (Barney et al., 2006). Those experiencing mental health issues who believe others will negatively view their need for help will be less willing to seek-help (Barney et al., 2006), which may have huge negative implications for their long-term health (White et al., 2011) while also placing significant burden on the healthcare system (White et al., 2011).

2.6.2.2. Poor MHL

Poor mental health knowledge, in particular, a lack of awareness of help resources (Gulliver et al., 2012a; Davies et al., 2000) and the symptoms of mental disorders (Gulliver et al., 2012a), can inhibit help-seeking and has been identified as a major barrier to help-seeking in young athletes (Gulliver et al., 2012a). Help-seeking may be inhibited by a lack of knowledge as to where (Abram et al., 2008), when (Biddle et al., 2007) and how (Gulliver et al., 2012a) to seek help or lack of clarity of the available services (Gulliver et al., 2012a; Boyd et al., 2007), what to expect during a consultation (Gulliver et al., 2012a) and which healthcare professional should be consulted (Gulliver et al., 2012a). Elite athletes perceive mood fluctuations as normal but report it can be difficult to distinguish between mood changes caused by symptoms of depression and anxiety or fatigue attributed to physical exhaustion (Gulliver et al., 2012a). The same may be the case for injured athletes, who may perceive their mental health symptoms to be normal of the grief response to injury (Van der Poel and Nel, 2011) and not excessive enough to warrant help. A major concern is the lack of consideration of a GP as a source of help when experiencing mental health issues (Gulliver et al., 2010; Biddle et al., 2006), despite the important role of primary care in prevention, recognition, early intervention and

referral (Rothi and Leavey, 2006) and its relevance as the initial point of contact with professional help sources (Rickwood et al., 2007). GP's also have a role in discussing confidentiality of services, clarifying costs and outlining what to expect and the likely duration of a help-seeking consultation (Rickwood et al., 2005).

2.6.2.3. Lack of Accessibility

Issues with cost (Abram et al., 2008; Jorm et al., 2007; Sheffield et al., 2004), time (West et al., 1991) and transport (Aisbett et al., 2007) are practical access barriers. Although, there is a current lack of consensus on the cost of accessing mental health services, recent media reports suggest accessing psychiatry services in Ireland can range from €70 to €120 per session (Holmquist, 2015), with the potential of an estimated yearly cost of €3500 when accessing services weekly (McBride, 2009). Time may be an issue when injured athletes are forced to balance injury treatments and rehabilitation appointments with work or college commitments and these demanding schedules often may limit the available time to seek professional mental health supports when necessary (Lopez and Levy, 2013). Time may be a particular problem accessing help-seeking services that operate during regular business hours (Lopez and Levy, 2013), when work, college or family commitments may take precedent. In rural settings, help-seeking may be limited when it is difficult to source help locally (Gulliver et al., 2010) or when accessing transport to urban areas is not convenient.

Irish elite athletes also report lack of accessibility and availability of sport psychology services as moderating factors in their attitudes toward sport psychology consulting (Lavallee et al., 2005). Despite showing personal willingness to seek help for enhancing performance and dealing with injury and rehabilitation, 47.8% of Irish elite athletes, which included Gaelic footballers, acknowledged access to sport psychology consulting services is poor (Woods et al., 2015). Access to specialist services for those in need of psychological healthcare is also limited in Ireland at present due to the reported unavailability of inpatient beds, understaffed and under-trained emergency department staff, dependency on pharmacological treatments and the lack of adequate community based clinical services (College of Psychiatrists of Ireland, 2017). In addition, access is limited with prolonged waiting times for accessing mental health services, estimated to be between eight to ten weeks (Gibbons et al., 2012).

2.6.2.4. Poor Social Support Structures

Social support refers to the number and quality of individuals on whom a person can depend on during periods of stress (Yang et al., 2010), with family, friends, athletic trainers and physicians regarded as important sources of social support among injured athletes (Yang et al., 2010). A breakdown in the relationship between an injured player and coach may occur following injury (Granito, 2002). In particular, female athletes report often feeling ignored when not able to participate or meet task demands on field when injured (Granito, 2002) and thus, reluctance to initiate a change in the coach-player dynamic may be a barrier to help-seeking. In addition, those socially isolated and with limited support structures may experience greater difficulty in seeking help compared with those with moderate or high levels of social support (Nagai, 2015). Those with low emotional competence, which describes the process of identifying, describing and understanding emotions and the ability to manage these emotions effectively (Mayer et al., 1999), may have fewer sources of social support and less opportunities for seeking informal help (Ciarrochi et al., 2003) or may be too ashamed to seek help due to their perceived lack of competence (Rickwood et al., 2005). Those experiencing a mental health issue may also be unwilling to burden their peers or family with their issues (Gulliver et al., 2010).

2.6.2.5. Cultural Norms

Elite male athletes report greater difficulty in seeking help compared to females (Gulliver et al., 2012a). The concept of masculinity can drive men to strive to perfect their physical appearance, treating the body as an object to be worked on and perhaps abused (McCreary and Saucier, 2009) in order to meet socio-cultural norms that suggest a need for muscularity (Gough, 2013). Male athletes are also assumed to have a mental toughness, defined as a natural or developed psychological mind-set that allows greater coping with the demands of sports participation and a determination to remain focused, confident and in control in highly-pressurised situations (Jones et al., 2007). Assumptions of masculinity, in particular, limiting emotional expression, normalising pain or lacking the ability to identify problems (Moller-Leimkuhler, 2000; White and Johnson, 2000), may cause men to conceal vulnerability, not admit personal problems (Addis and Mahalik, 2003; Davies et al., 2000; Jordan and Quinn, 1997) and be unwilling to disclose problems (Gough, 2013). Masculinity is a huge concern in modern healthcare, with men reluctant

to discuss emotion (Johnson et al., 2012), feeling required to assign to social gender norms (Davies et al., 2000) and pressurised into traditional stereotypes that identify men as being strong, independent and aggressive (Davies et al., 2000). These stereotypical gender roles can regard weakness and a need for help as feminine actions that need to be avoided (Galdas et al., 2005) and limit men's ability to be open and honest about their emotions (Davies et al., 2000).

Career and lifestyle choices may also influence male help-seeking (Lee and Owens, 2002), where, for example, workers in traditionally male-dominated construction settings may be assumed as having greater masculinity and less need for physical or mental health consultation. Embarrassment has also been recognised as an inhibitor of male help-seeking (Yousaf et al., 2015; Gulliver et al., 2012b). Irish men who report embarrassment when experiencing mental health issues are 7 times less likely to seek help than those who are not embarrassed (Doherty and Kartalova-O'Doherty, 2010). Unwillingness to seek help for serious injury or illness and delaying or avoiding accessing health services can lead to morbidity and mortality issues (Gough, 2013; Courtenay, 2000). There is greater perceived social acceptance allowing women to express their emotional needs (Rickwood et al., 2005; Raviv et al., 2000). Despite the traditional view of help-seeking as a weakness in men, there is a potential for modern society to refine practices and beliefs and make help-seeking congruent with valued masculinities and eliminate its perception as a feminine action (Gough, 2013).

2.6.2.6. Negative Past Experiences

Negative previous experiences utilising mental health resources is a significant barrier to future help-seeking among athletes (Gulliver et al., 2012a) and young people (Rickwood et al., 2005). Athletes with negative past experiences of mental health help-seeking are more hostile to future use of services than those with highly effective previous help-seeking experiences (Wrisberg et al., 2009). Athletes who were forced by a coach to attend psychological counselling services report less appreciation of services and an unwillingness to interact with the care provider (Gulliver et al., 2012a). Negative experiences, which can initiate an unwillingness to seek help in the future, even with a different health care provider (Gulliver et al., 2012a), may be attributed to perceptions

that previous help-seeking experiences were not beneficial and helpful (Rickwood et al., 2007) or their problems were not listened to or taken seriously (Rickwood et al., 2005).

2.6.2.7. Perceived Issues with Help-Provider

Lack of trust in the help provider has been reported as a barrier to help-seeking (Wilson and Deane, 2001; Davies et al., 2000) and athletes have expressed an explicit worry that help-seeking sources may not understand their problem (Gulliver et al., 2012a). Those who are not comfortable talking about personal issues are 5 times less likely to access mental health help-seeking services (Diala et al., 2000), with difficulties confiding in a stranger when discussing their most personal experiences (Rickwood et al. 2005), fears over lack of confidentiality (Gulliver et al., 2012a) or the perceived loss of control associated with help-seeking (Yousaf et al., 2015) potentially affecting help-seeking. Lack of trust may also be associated with stigma and a fear of a breach of confidentiality and parents, coaches, teammates or peers finding out about an individual's help-seeking (Gulliver et al., 2010).

2.6.2.8. Subjective Need

Collegiate athletes report a perception that help is not needed (Bird et al., 2020; Bird et al., 2018; Watson, 2006) because they can handle the issues by themselves or believe they do not need help for the symptoms they are experiencing (Bird et al., 2018). The denial of a need for help or help-negation, which describes the process of not utilising available help when required (Rickwood et al., 2005), may be the case when an individual believes they can manage on their own rather than seek the help of others (Gulliver et al., 2010). The perception that help is not needed may be enhanced by the 'win at all costs' mentality in sport, where admitting a need for help may negatively affect chances of success (Watson, 2006). Young people with greater hopelessness are less likely to seek help when experiencing extreme mental health issues (Wilson et al., 2005a) and this hopelessness may emphasise help-negation with negative appraisal of available help-seeking sources (Rickwood et al., 2005). Those suffering from severe depressive symptoms may experience hopelessness and suicidal ideation, which consequently reduce motivation to cope and reduce the subjective need and desire for seeking help (Nagai, 2015). Symptom minimising has also been shown to be a prevalent barrier to help-seeking in men (Mansfield et al., 2005), with the belief that the symptoms can be self-controlled or the problem will go away in time (Smith et al., 2008a; Smith et al., 2008b).

2.6.3. Facilitators to Help-Seeking

Facilitators are factors that encourage the help-seeking process (Rickwood et al., 2005) and should help identify need, translate need into intentions and intentions into help-seeking behaviour (Rickwood et al., 2005). A number of facilitators to help-seeking have been identified in the literature to date, including social support, previous experience, access to online services, self-image, characteristics of provider, positive attitudes and severity of symptoms.

2.6.3.1. Social Support

Social support, encouragement and the positive attitude of others have been identified in elite athletes as significant help-seeking facilitators when experiencing a mental health issue (Gulliver et al., 2012a). In particular, social support from family, teammates and medical professionals is important following injury (Ruddock-Hudson et al., 2014). Team sport environments can provide greater social support as a supportive interpersonal interaction may be more readily accessible within the team environment (Drew and Matthews, 2019), particularly from teammates who may have been through similar injury experiences. Sensitivity in dealing with the issue is important (Gulliver et al., 2012a), which may be evident when the source of help-seeking has a close and trusting relationship with the help-seeker. Positive help-seeking attitudes of support structures surrounding the athlete are essential (Gulliver et al., 2012a), in particular, encouragement from the coach has been acknowledged as a facilitator of help-seeking behaviours (Gulliver et al., 2012a). Injured male athletes have reported seeking help from a partner when injured (Granito, 2002) and in a sample of men currently attending or with a recent history of utilising professional psychological support services, 55.0% were influenced to do so by an intimate partner, 47.0% by parents or family members and 40.0% by friends (Cusack et al., 2004). Referral from a peer to a professional resource identifies a friend's advocacy for that support, while empathising with the person in need of help and that projection and distancing the problem from themselves may not have the associated sense of weakness or inferiority that may be anticipated if seeking help for self (Raviv et al., 2000).

2.6.3.2. Previous Experience

Athletes with a positive history of engaging with a sport psychologist display greater appreciation for services (Gulliver et al., 2010; Lindsey et al., 2006; Timlin-Scalera et al.,

2003; Wilson and Deane, 2001), are less likely to be concerned about seeking help (Martin, 2005) and more likely to utilise services in the future (Rickwood et al., 2004). Having an established relationship with a provider (Gulliver et al., 2012a) and positive previous experiences (Koydemir-Özdena and Erel, 2010) can influence future help-seeking. Similar to the use of social support networks, help-seeking from a trusted source is facilitated due to the already established trusting relationship with the healthcare professional (Gulliver et al., 2012; Rickwood et al., 2007) and a degree of certainty that the provider adheres to confidentiality principles (Gulliver et al., 2012a). In addition, greater mental health knowledge may be evident in those with previous help-seeking experience, which can facilitate future help-seeking behaviours through awareness of available services, knowing what to expect when seeking help from a particular source and cognisance of when to seek help (Rickwood et al., 2005). It is understandable that those with greater knowledge and awareness of who to talk to when experiencing a mental health issue may facilitate help-seeking. Kelly et al. (2007) suggested promoting MHL in the community can facilitate help-seeking behaviour and allow individuals to aid others experiencing mental health issues.

2.6.3.3. Access to Online Services

Use of the internet to access health information has become more prevalent in recent years (Kauer et al. 2014; Eysenbach et al. 2002) and is reported to be associated with less stigma than face-to-face consultations (Davis-McCabe and Winthrop, 2010). Online services can be beneficial due to the lack of geographical boundaries (Kauer et al., 2014), availability 24 hours a day, 7 days a week and capacity to uphold anonymity of the help-seeker (Gulliver et al., 2012b). The ability to access online information and services which keep the help-seeker anonymous is preferred in young people (Horgan and Sweeney, 2010) and can facilitate help-seeking in athletes who may not be comfortable or confident in approaching help-seeking sources in person (Gulliver et al., 2012a; Griffiths and Christensen, 2006). Young people often utilise online mental health services due to the vast information available that is easy to find, fast, cheap and convenient (Horgan and Sweeney, 2010). Internet mental health services can improve access to help as they are available to anyone, anywhere and at any time (Bradley et al., 2012). Online resources can be particularly beneficial in crisis situations, where the mental health issue is severe but other support services are unavailable (Davis-McCabe and Winthrop, 2010). Internet-

based resources may be beneficial in helping an athlete determine if additional help-seeking with a professional may be required (Gulliver et al., 2012a) and can be a good start in finding out where to go for further assistance (Horgan and Sweeney, 2010).

Online mental health services equip help-seekers with the ability to utilise a variety of online care resources, such as interactive games or eLearning websites (Christensen and Petrie, 2013; Christensen and Hickie, 2010), while also facilitating access to face-to-face services (Kauer et al., 2014). Structured online therapy programmes, involving cognitive behavioural therapies delivered interactively, have been shown to effectively improve mental health outcomes in adolescents (Merry et al., 2012; Sethi et al., 2010) and adults (Christensen et al., 2006). An online MHL and destigmatisation programme was successful in improving depression and anxiety literacy in athletes both post-intervention and at 3-month follow-up when compared to a control group ($P<0.05$) (Gulliver et al., 2012b). Stigma for depression and anxiety was also reduced but the effects were not sustained at 3 months post for depression stigma (Gulliver et al., 2012b). However, barriers to the use of online help-seeking sources are also evident, which include lack of awareness of available services, preference for consultations in person, poor motivation, fears over confidentiality and unfavourable online content that is imprecise, inaccurate or too technical to understand (Kauer et al., 2014).

2.6.3.4. Self-Image

Those with a positive self-image and perception of self are more likely to seek help as they may not perceive help-seeking as a threat to their self-esteem and are less affected by negative opinions about themselves (Raviv et al., 2000), which can also act as a motivator to seeking help (Lannin et al., 2013). Similarly, those with high emotional competence may show greater awareness of personal feelings and the ability to feel comfortable expressing these feelings to others, which is a facilitator of mental health help-seeking (Gulliver et al., 2012a; Rickwood et al., 2005). On the other hand, those with low emotional competence may feel less capable of handling emotional problems on their own and feel a need to seek help (Rickwood et al., 2005).

2.6.3.5. Characteristics of Provider

Athletes deem friendliness of the care provider to be an important facilitator of help-seeking, with a noted unwillingness to confide in someone not considered friendly and

approachable (Gulliver et al., 2012a). The friendliness of administration staff is less likely to inhibit or facilitate help-seeking in athletes (Gulliver et al., 2012a). In addition, athletes prefer to seek help from those with knowledge and experience of sports participation (Lopez and Levy, 2013), which may be due to the help providers ability to empathise with the injured athlete and understand their sporting experiences and requirements as an athlete. Counsellors and sports psychologists with a specific understanding of the negative consequences of seeking professional psychological help among athletes will be better equipped to assist those athletes to negotiate the challenges they experience (Fletcher et al., 2003). Athletes expect knowledge and competence from professionals providing psychological help (Lopez and Levy, 2013) and may deem those with sports experience more suitable.

2.6.3.6. Positive Attitudes

Having a positive attitude to seeking help is a common facilitator to help-seeking in young people (Gulliver et al., 2010). Ease of expressing emotion has been suggested as a facilitator to help-seeking in athletes (Gulliver et al., 2012a), with emotional openness predicting favourable help-seeking attitudes in collegiate students (adjusted R^2=0.24; P<0.05) (Komiya et al., 2000). Irish elite athletes have an openness and positive attitude to the use of sport psychology services (Lavallee et al., 2005). More positive orientations to help-seeking can lead to an enthusiasm to seek help or a willingness to seek help from mental health practitioners rather than a GP (Rickwood and Braithwaite, 1994; Tijhuis et al., 1990) and can be influenced by a greater willingness to disclose private information, having confiding relationships, knowing others who have sought help and private self-consciousness (Rickwood and Braithwaite, 1994). The need for help can be defined as an epidemiologically defined need (i.e., evident emotional or behavioural disorder) or subjective or perceived need (Cauce et al., 2002). A greater subjective need for help-seeking may be more evident in those with greater symptom severity (Rickwood, 1995). Improving attitudes and perceptions of the usefulness of mental health help-seeking resources and associating help-seeking with greater positive orientation may be beneficial in increasing the use of mental health services (Rickwood et al., 2005).

2.6.3.7. Severity of Symptoms

The willingness to seek help for health-related matters is related to the perceived seriousness of the problem (r=0.32; P<0.05) (Hinson and Swanson, 1993) and the severity

of symptoms (Nagai, 2015; Bebbington et al., 2000). The greater number of symptoms of mental health issues experienced predict the use of family (OR=1.06; P<0.05), GP (OR=1.16; P<0.05) and counselling help services (OR=1.10; P<0.05) (Jorm et al., 2000). Depression can reduce help-seeking in the short term as there may be an associated feeling of helplessness but prolonged depression can elicit severe distress which in turn can motivate help-seeking behaviours (Nagai, 2015). With greater severity of symptoms of a mental health issue, the benefits (coping and recovery) may outweigh the costs (social stigma and impaired self-esteem) and help-seeking may be more likely (Raviv et al., 2000). Athletes have recognised the inability to determine if their symptoms are severe enough to warrant professional psychological help (Gulliver et al., 2012a), but with that knowledge, athletes may be self-aware of the severity of symptoms and help-seeking may be facilitated.

2.6.4. Summary of Mental Health and Help-Seeking

Efficient help-seeking behaviours are vital for mental health and wellbeing but professional psychological help-seeking is uncommon in athletes (Gorczynski et al., 2019). Stigma, poor MHL, lack of accessibility, poor social support structures, cultural norms, negative past experiences, perceived issues with the help-provider and subjective need have been acknowledged as barriers to help-seeking in current literature. In contrast, factors related to social support, previous experience, access to online services, self-image, characteristics of the help provider, positive attitudes and severity of symptoms have been acknowledged as help-seeking facilitators. However, there is currently no research available highlighting the barriers and facilitators to mental health help-seeking among Gaelic footballers. An awareness of the factors inhibiting and facilitating help-seeking is necessary to facilitate the development of appropriate interventions, which may initiate change and promote mental health help-seeking among Gaelic footballers.

2.7 MHL Interventions

The prevention and early detection of mental health issues in athletes is essential and should be promoted in order to allow mental and physical health be viewed with similar importance and to optimise athlete wellbeing and performance (Purcell et al., 2019). MHL interventions may be an appropriate method of increasing help-seeking for mental health

issues (Chambers et al., 2015), by reducing barriers and facilitating help-seeking and aiding prevention and early detection of mental health issues.

2.7.1. MHL

MHL refers to an individual's knowledge and beliefs about mental health issues that aid their recognition, management or prevention (Jorm et al., 1997). The MHL framework defines three key areas; recognition, knowledge and attitudes (Jorm et al., 1997). Recognition includes the ability to recognise specific disorders, knowledge refers to knowing how to seek mental health information and knowing risk factors and causes, self-treatments and professional help available, while attitudes relates to recognition and appropriate help-seeking (Jorm et al., 1997). MHL was further refined to have four distinct components; knowledge about how to obtain and maintain good mental health, knowledge about mental disorders and their treatments, strategies aimed at decreasing stigma and enhancement of help-seeking efficacy (i.e., knowing when and where to seek help, knowing what to expect when seeking help and being empowered to receive the best available help) (Kutcher et al., 2015). Therefore, MHL is a key component of mental health care (Jung et al., 2016) and is concerned with the skills of the individual and how changes to their knowledge and attitudes can elicit improved help-seeking and their ability to self-manage their mental health (Gorczynski et al., 2020a; Wei et al., 2015). In addition, MHL can be viewed with a more holistic approach where knowledge aids self-management but individuals can also aid others experiencing mental health issues (Jorm, 2012).

MHL is the foundation for mental health promotion, prevention and health decision making and can allow for a lifetime of improved mental health and better outcomes for mental disorders (Kutcher et al., 2015). MHL encourages communities to create sustainable approaches for athletes to address and deal with mental ill-health and its causes and consequences, with the aim of equipping individuals with the necessary skills to optimise and maintain their mental health (Gorczynski et al., 2019). Higher levels of MHL can improve the recognition of mental health disorders, increase professional referral knowledge, reduce stigma, improve confidence to help someone with a mental health issue and improve intentions to seek support (Breslin et al., 2017b). Enhancing MHL may facilitate help-seeking behaviours and the use of self-help strategies (Sullivan

et al., 2021). In addition, increasing an athlete's knowledge of mental health conditions, their treatments and prevalence within society and exposure to those with a mental health problem can predict athletes' intentions to mix with those with a mental health issue (Breslin et al., 2019a; Breslin et al., 2017a) and can contribute to the reduction of stigma (Jorm, 2000). In contrast, a lack of mental health knowledge can result in prejudice and stigma towards those experiencing mental health issues, thus leading to discriminatory behaviour (Spiker and Hammer, 2019). MHL is subjective to each individual and can be affected by age, place of residence, education, socioeconomic class, personal experience and gender (Kutcher et al., 2015; Gibbons et al., 2015).

2.7.2 Mental Health Promotion

Foundations and charitable organisations in Ireland are currently working to promote mental health. State of Mind Ireland (SOMI) is an organisation that aims to improve the mental health, wellbeing and working life of sports players and sporting communities in Ireland (State of Mind Ireland, 2014). Mental fitness, the core concept of the programme, is promoted through 'Five a Day for Health and Happiness'; Connect, Be Active, Take Notice, Keep Learning and Give. The programme has been utilised in research conducted by Breslin et al. (2021), Shannon et al. (2019) and Breslin et al. (2018) (Table 2.11). In addition, Mental Health First Aid (MHFA), utilised in research conducted by Pierce et al. (2010) and Bapat et al. (2009), is an educational programme designed to help individuals improve their knowledge of mental wellbeing and mental health symptoms and disorders and aid those who may be experiencing symptoms of a mental disorder (Kitchener and Jorm, 2002). Aware and Mental Health Ireland are additional charitable organisations offering mental health and wellbeing workshops in Irish communities (Aware, 2021; Mental Health Ireland, 2021).

A number of mental health initiatives have previously been introduced within the GAA. The Mental Health Huddle (Gaelic Athletic Association, 2019a), which aims to raise awareness of the importance of emotional support and mental and physical fitness for players and management, involves a 10-minute focused talk from the Samaritans at the end of a team's regular training. The Little Things mental health campaign, launched by the GAA and Health Service Executive (HSE), aims to normalise the conversation around mental health (Gaelic Athletic Association, 2017). The initiative highlights little things

that can make a big difference to mental health and wellbeing; keeping active, talking about your problems, looking out for others, doing things with others, eating healthily, staying in touch, drinking less alcohol and sleeping well. An additional mental health initiative, Play in my Boots, supported by the GAA and St. Patrick's Mental Health Services, aims to de-stigmatise mental health by speaking to players in a sporting language familiar to them and uses the term 'mental fitness' to emphasise the positive nature of emotional wellbeing (Gaelic Athletic Association, 2014b). The GAA Mental Health Charter (Gaelic Athletic Association, 2014c), a policy document helping clubs develop a culture that supports and promotes positive mental health, is also included as part of the Play in my Boots campaign. The resource is designed to reinforce the Give Respect, Get Respect GAA initiative and details seven key elements; Respect, Encouraging, Supportive, Positive, Enabling, Considerate and Tolerant. Ulster GAA developed the Heads Up mental health campaign (Ulster GAA, 2013), which details four key sections; mental wellbeing, mental illness, GAA clubs and their ability to promote mental wellbeing and getting help. Ulster GAA also utilises the Take 5 Steps to Wellbeing initiative; Connect, Be active, Take notice, Keep learning and Give (Ulster GAA, 2017). However, the effectiveness of these initiatives in changing mental health knowledge or perceptions has not been examined. In addition, these initiatives fail to address the barriers and facilitators to help-seeking specifically acknowledged by Gaelic footballers.

2.7.3 MHL Interventions

Recent consensus, expert and position statements have acknowledged the need for athlete education aimed at increasing MHL (Breslin et al., 2019b; Gorczynski et al., 2019; Henriksen et al., 2019; Reardon et al., 2019; Van Slingerland et al., 2019; Moesch et al., 2018; Schinke et al., 2018). A number of MHL interventions have been implemented in sporting populations to date (Table 2.11).

Table 2.11 MHL interventions in athletes

Study and Design	Theoretical Framework	Participants	Control	Intervention	Delivery Method and Duration	Supplementary Material	Measures
Breslin et al. (2021) Controlled before-after study	IBC	Athletes and non-athletes (N=200) Intervention (N=146) Control (N=54)	N/A	*SOMI:* a) Symptoms and signs of stressors and their impact on MH b) How to self-manage MH symptoms c) To identify self-management resources and strategies	In-person by experienced MH and wellbeing tutors in partnership with student support services 75 minutes	Self-help audit tools, websites and free downloadable MH mobile applications.	Baseline and post-intervention: -Treatment Self-Regulation Questionnaire -Adapted TPB Questionnaire
Chow et al. (2020) Pre-post design with follow-up	N/A	Student-athletes (N=33)	N/A	Four sessions over four consecutive weeks examining: 1. MHL 2. Empathy 3. Counter stereotyping 4. Contact	In-person by two facilitators with applied and research experience in athlete MH 60 minutes	N/A	Pre- and post-intervention and 1-month post: -MHLS -Modified DSS -SSOSH -ATSPPH-SF -ISCI -Implicit Stigma

							Association Test
Hurley et al. (2020) Controlled before-after study	N/A	Parents of adolescents participating in community youth sport (N=540) Intervention (N=352) Control (N=188)	N/A	Workshop addressed parents' attitudes towards seeking knowledge and help, capacity to recognise development or signs of a disorder, knowledge about professional help-seeking and treatment options, capacity to help, knowledge of preventative and self-help strategies and knowledge and capacity to help.	In-person by facilitator with MHFA certification and experience in delivering MH workshops and working in sport clubs 50 to 75 minutes	Pamphlet containing key information from workshop. Participants also directed to Ahead of the Game project website and other online resources.	Baseline and 1-month post: -A-Lit and D-Lit -MHLS -GHSQ -Parental Confidence to Provide Help -Parent Social Support Networks in the Sport Club Environment -K6
Liddle et al. (2019) Cluster RCT	IBC	Youth sport participants (N=102) Intervention (N=47) Waitlist comparison (N=55)	N/A	*Help Out a Mate (HOAM):* What is MH and mental illness, myths about mental illness, what is depression and anxiety, how to provide help and where to get reliable information PowerPoint presentation, facilitated discussions	In-person by 2 male volunteer presenters with lived experience of mental illness 45 minutes	Business card-sized "Man Card" – key steps on how to help a friend (HOAM action plan) and a list of MH resources.	2 weeks pre-workshop, within 1 week post/2 weeks post by waitlist comparison group and 4 weeks post:

				between participants and presenters and brief role-plays.			-Previous Contact and Helping Experience with People who have MH Problems -Own MH Experience Intentions to Provide Help -D-Lit and A-Lit -GHSQ -Confidence to Provide Help -MHLS (subscales) -K6
Shannon et al. (2019) Controlled before-after study	SDT	Student-athletes (N=238) Intervention (N=108) Control (N=130)	N/A	*SOMI:* Instructional workshop on MH and mindfulness and home-directed mindfulness training programme	In-person by psychiatrist and student counsellor with extensive course delivery experience 90 minutes	Mindfulness mobile application	Baseline and 2-weeks post-intervention: -MAAS -PCS -PSS -WEMWBS

Breslin et al. (2018) Controlled before-after study	N/A	Student-athletes (N=100) Intervention (N=56) Control (N=44)	Seminar on an unrelated topic on child physical health	*SOMI:* Multicomponent MH and wellbeing awareness programme	In-person by experienced and trained MH and wellbeing tutors 75 minutes	N/A	Pre- and post-intervention and 3 months post: -RIBS -MAKS -Short-WEMWBS -BRS
Hurley et al. (2018) Controlled before-after study	N/A	Parents (N=66) Intervention (N=44) Control (N=24)	N/A	Intervention addressed attitudes towards seeking knowledge and help, capacity to recognise development/signs of a disorder, knowledge about professional help-seeking and treatment options, , knowledge of preventive and self-help strategies and knowledge and capacity to help	In-person by lead facilitator with MHFA certification and experience in delivering MH workshop 55-80 minutes (mean: 65 minutes)	Pamphlet containing key information from workshop and directed to online resources should they require more information	Baseline, post-workshop and at 1 month: -A-Lit and D-Lit -MHLS -K6 -Parental Confidence to Provide Help
Breslin et al. (2017a) Quasi-RCT	TPB	Coaches (N=244) Intervention (N=184)	Coaching programme without MH content	*Mood Matters in Sport (MMHS):* Definition of MH awareness, factors and problems and illnesses, signs and symptoms of	In-person by public health agency provider	N/A	Pre- and post-intervention: -RIBS -MAKS

		Control (N=60)		mental illness, treatments, self-help strategies and sources of aid.	3 hour programme – one session		-Confidence in ability to help someone with a MH problem
Kern et al. (2017) Pre-post design	N/A	Student-athletes (N=626)	N/A	Contact and education-based presentation to destigmatise and educate about MH.	In-person by clinically licensed social worker and athletic counsellor 1 hour	N/A	Pre- and post-intervention: Questions assessed four categories: Supporting teammates, Own help seeking, Knowledge, and Stigma.
Sebbens et al. (2016) Quasi-RCT	N/A	Elite sport staff (N=166) Experimental group (N=85) Waitlist comparison group (N=81)	N/A	*Mental Health in Sport (MHS):* MH knowledge and confidence programme aimed to promote early intervention by equipping participants with the knowledge and confidence to help someone who may be experiencing a MH problem	In-person by 2 registered psychologists working in sport environments 4 hours	Information pack: -business cards of workshop facilitators -flyer with summary of key information -card summarising MHS action plan -suicide information sheet	Pre-workshop, 2-4 weeks post and 2-4 weeks after waitlist comparison group attended workshop -D-Lit and A-Lit -Confidence in helping

						-resources about depression and anxiety	someone experiencing a MH problem
Van Raalte et al. (2015) RCT	N/.A	Student athletes (N=153) Control (N=70) Intervention (N=76)	Viewed control website	MHL web-based programme using interactive exercises, photographic images, text and video clips depicting student-athletes making referrals for substance abuse, eating disorders, depression and anxiety	Online 1 day – online sessions lasting at least 10 minutes	N/A	Pre- and post-intervention: -MHRES -MHRK
Gulliver et al. (2012b) RCT	HSM	Elite athletes (N=59) Control (N=16) MHL list (N=12) Feedback list (N=15) Help-seeking list (N=16)	Received emails to surveys only	MHL/destigmatisation – 34 webpages designed to increase MHL and decrease stigma, specifically targeting depression and anxiety Feedback – 2 interactive quizzes providing tailored feedback to participants on their level of depression and anxiety Help-seeking list – 3 pages each week highlighting help-seeking sources	Online 2 weeks	N/A	Pre- and post-intervention and 3 and 6 months post: -ATSPPH-SF -GHSQ -AHSQ -D-Lit and A-Lit -Personal stigma items of DSS and GASS

Pierce et al. (2010) Pre-post design	N/A	Coaches and other club leaders (N=36)	N/A	*Coach the Coach:* MHFA training, including 12-hour psycho-educational group session for football club leaders	In-person by MHFA qualified instructor 12 hours over 3 weeks	N/A	Pre MHFA training and 6 months post: -Questionnaire measuring MH recognition, knowledge and confidence -Customised measure around attitudes and recognition of depression in a clinical scenario
Bapat et al. (2009) Pre-post design	N/A	Senior and junior players, parents and coaches (N=40)	N/A	*Read the Play* training – based on Youth MHFA Training. Covered symptoms and functional implications of MH disorders, possible risk factors, and where and how to get help, with an emphasis on local referral sources.	In-person by 2 experienced MH clinician trainers 8 hours over 3 weeks	Youth MHFA Training manual, resource pack containing notes and youth MH fact sheets. Additional pack provided to each club.	Beginning of first training session and end of last session: -Case vignettes -Stigma questionnaire -Knowledge questionnaire

Note: A-Lit=Anxiety Literacy; AHSQ=Actual Help-Seeking Questionnaire; ATSPPH-SF=Attitudes towards Seeking Professional Psychological Help – Short Form; BRS=Brief Resilience Scale; D-Lit=Depression Literacy; DSS=Depression Stigma Scale; GASS=Generalised Anxiety Stigma Scale; GHSQ=General Help-Seeking Questionnaire; HOAM=Help Out a Mate; HSM=Help-Seeking model; IBC=Integrated Behaviour Change model; ISCI=Intentions to Seek Counselling Inventory; K6=Kessler Psychological Distress Scale; MAAS=Mindfulness Attention Awareness Scale; MAKS=Mental Health Knowledge Schedule; MH=mental health; MHFA=mental health first aid; MHL=mental health literacy; MHLS=Mental Health Literacy Scale; MHRES=Mental Health Referral Efficacy Scale; MHRK=Mental Health Referral Knowledge scale; MHS=Mental Health in Sport; N/A=not applicable; PCS=Perceived Competence Scale; PSS=Perceived Stress Scale; RCT=randomised controlled trial; RIBS=Reported and Intended Behaviour Scale; SDT=Self-Determination Theory; SOMI=State of Mind Ireland; SSOSH=Self-Stigma of Seeking Help Scale; TPB=Theory of Planned Behaviour; WEMWBS=Warwick-Edinburgh Mental Well-Being Scale

2.7.3.1. Research Design

Both randomised and non-randomised controlled trials have previously been utilised in intervention studies (Table 2.11). Randomised controlled trials allow for the random allocation of participants to an intervention or control (Reeves et al., 2017) and represent the methodological gold-standard in medical research due to their ability to eliminate known and unknown confounding factors (Tonning et al., 2019). Randomised controlled trials were conducted in MHL interventions in athletes by Liddle et al. (2019), Van Raalte et al. (2015) and Gulliver et al. (2012b). However, randomised controlled trials may not always be feasible and non-randomised designs, such as quasi-randomised controlled trials may be an alternative approach, as utilised by Breslin et al. (2017b) and Sebbens et al. (2016). In a quasi-experimental design, participants are allocated in a quasi-random manner, which may introduce bias or produce a less credible study (Reeves et al., 2017). Controlled before-after designs were also commonly utilised (Breslin et al., 2021; Hurley et al., 2020; Shannon et al., 2019; Breslin et al., 2018; Hurley et al., 2018), which do not allow for random allocation of participants to an intervention or control group. Controlled before-after studies are associated with a high risk of bias as there may be unidentified differences between groups affecting outcome measures (Cochrane EPOC, 2017). Pre-post design studies, which do not recruit a control group, were conducted by Chow et al. (2020), Kern et al. (2017), Pierce et al. (2010) and Bapat et al. (2009). Failure to recruit a control group makes it difficult to determine if identified changes in MHL were as a result of the intervention or were produced by chance, therefore making it impossible to draw meaningful conclusions from the data (Joy et al., 2005).

2.7.3.2. Theoretical Framework

It is recommended that evidence-based interventions have a theoretical framework (Breslin et al., 2017b), in order to potentially maximise the efficacy of an intervention (Davis et al., 2015). The integrated behaviour change model (Breslin et al., 2021; Liddle et al., 2019), self-determination theory (Shannon et al., 2019), theory of planned behaviour (Breslin et al., 2017a) and help-seeking model (Gulliver et al., 2012b) have been utilised in MHL interventions in sporting populations. However, the majority of MHL interventions are not conceptualised by an appropriate theory or model (Chow et al., 2020; Hurley et al., 2020; Breslin et al., 2018; Hurley et al., 2018; Kern et al., 2017; Sebbens et al., 2016; Van Raalte et al., 2015; Pierce et al., 2010; Bapat et al., 2009).

2.7.3.3. Participants

The majority of MHL interventions involving sporting populations have been implemented with collegiate athletes (Table 2.11) (Breslin et al., 2021; Chow et al., 2020; Shannon et al., 2019; Breslin et al., 2018; Kern et al., 2017; Van Raalte et al., 2015). Delivering interventions to student athletes can be beneficial as programmes are embedded in the curriculum and scheduled during class time as opposed to opt-in sessions (Breslin et al., 2018). In addition, engaging student athletes in a comfortable setting, such as in the classroom, can allow for greater discussion of mental health, which may reduce stigma and avoidance (Breslin et al., 2018). Previous MHL interventions have also been implemented with parents of youth athletes (Hurley et al., 2020; Hurley et al., 2018; Bapat et al., 2009), sports coaches (Breslin et al., 2017a; Pierce et al., 2010; Bapat et al., 2009) and elite sports staff (Sebbens et al., 2016). MHL interventions should consider the collective awareness of those involved in sport, including players, coaches, officials, sports science and sports medicine team, support staff, family and friends (Gorczynski et al., 2020a), as all invested stakeholders have an important role in supporting an open, stigma-free mental health environment (Breslin et al., 2019b). In addition, the sample size in previous intervention studies has varied (N=33-626) (Table 2.11). Small sample sizes decrease the power of a study and increase the risk of conducting type II errors (Gulliver et al., 2012b). The design of intervention studies must therefore, consider methodological rigor and the determination of adequate sample size and power (Breslin et al., 2019b) to ensure the clinical significance and overall effectiveness of the programme (Breslin et al., 2017b).

2.7.3.4. Delivery Method

Delivery of intervention content in-person by trained professionals with mental health experience and knowledge has been the preferred delivery method in previous studies (Table 2.11) (Chow et al., 2020; Hurley et al., 2020; Shannon et al., 2019; Breslin et al., 2018; Hurley et al., 2018; Breslin et al., 2017a; Kern et al., 2017; Sebbens et al., 2016; Pierce et al., 2010; Bapat et al., 2009). Student support services, student mentees (Breslin et al., 2021) and volunteers with lived experience of mental illness (Liddle et al., 2019) have also been involved in content delivery. The use of facilitators with lived experience of mental health issues can aid mental health promotion and reduce stigma (Liddle et al., 2019). Intervention design must ensure those delivering content have an appropriate level

of training (Breslin et al., 2019b). Delivery by trained professionals with adequate knowledge and experience can be beneficial as those facilitators may be competent in detecting observable mood or behaviour changes, can signpost a person to help resources where necessary (Breslin et al., 2019b) and can discuss and explore participant questions and concerns (Purcell et al., 2019). Elite athletes acknowledged having an experienced facilitator was an integral part of the delivery of a mental health awareness programme (Breslin et al., 2018), while adolescent athletes also positively rated the experience, knowledge and approachability of facilitators (Liddle et al., 2019).

The online delivery of interventions through websites and web-based programmes has also been utilised (Van Raalte et al., 2015; Gulliver et al., 2012b). Online interventions provide direct and convenient access to resources that may not otherwise be available, while also aiding privacy and anonymity (Clarke et al., 2015). Online delivery also allows intervention content to reach a large number and broad range of athletes cost-effectively, irrespective of geographical location (Gulliver et al., 2012b). Web-based programme tailored for a specific cohort of athletes may be beneficial for mental health (Van Raalte et al., 2015) and may be a particularly favourable approach in young athletes who may be highly proficient in utilising online technologies (Rice et al., 2016). However, internet-based mental health interventions should not be seen to replace face-to-face services but instead supplement and provide a gateway to mental health services (Barak and Grohol, 2011).

The majority of intervention studies were delivered over 45 to 90 minutes (Breslin et al., 2021; Chow et al., 2020; Hurley et al., 2020; Liddle et al., 2019; Shannon et al., 2019; Breslin et al., 2018; Hurley et al., 2018; Kern et al., 2017). The duration of some studies were more extensive (3 to 4 hours) (Breslin et al., 2017a; Sebbens et al., 2016) or were delivered over a number of weeks (Gulliver et al., 2012b; Pierce et al., 2010; Bapat et al., 2009) (Table 2.11). The online intervention conducted by Van Raalte et al. (2015) had the shortest duration of 10 minutes. Brief interventions may allow for greater uptake and increase the reach and relevance of MHL education in young athletes (Liddle et al., 2019). In particular, feedback provided by participants indicated the short duration of the programme utilised by Breslin et al. (2018) was advantageous. Brief interventions may be beneficial due to the extensive demands on athletes but considering the brevity, booster

sessions may be necessary after a period of time to supplement and refresh athletes' knowledge (Okan et al., 2019).

Supplementary material was provided in most studies (Table 2.11), through information leaflets (Hurley et al., 2020; Liddle et al., 2019; Hurley et al., 2018; Sebbens et al., 2016; Bapat et al., 2009), additional online resources (Breslin et al., 2021; Hurley et al., 2020; Hurley et al., 2018) or downloadable apps (Breslin et al., 2021; Shannon et al., 2019). Research on the effect of supplementary material in MHL interventions is lacking but it is suggested that additional material provided may refresh key intervention components or can direct participants to other resources should additional information be required (Hurley et al., 2018).

2.7.3.5. Follow-Up

Previous interventions most commonly completed measures immediately pre- and post-intervention (Table 2.11) (Breslin et al., 2021; Breslin et al., 2017a; Kern et al., 2017; Van Raalte et al., 2015; Bapat et al., 2009). Further studies completed measures pre- and post-intervention and also completed a 1-month (Chow et al., 2020; Liddle et al., 2019; Hurley et al., 2018) or 3-month follow-up (Breslin et al., 2018) (Table 2.11). Lack of or short follow-up periods may not be sufficient to examine if changes were sustained or developed over time (Liddle et al., 2019), while Breslin et al. (2018) were prevented from establishing the long-term effects of the programme due to the high attrition rate and failure of participants to return follow-up measures at 3-months. A number of previous interventions also completed baseline measures, with follow-up at 2-weeks (Shannon et al., 2019), 1-month (Hurley et al., 2020) or 6-months (Pierce et al., 2010) (Table 2.11). Gulliver et al. (2012b) completed measures 1-week pre and post-intervention and completed follow-up at 3 and 6 months. Sebbens et al. (2016) completed measures pre-intervention, 2-4 weeks after the intervention group received intervention content and 2-4 weeks after the waitlist group received intervention content. These studies failed to repeat measures immediately post-intervention and were unable to examine immediate effects of the intervention.

2.7.3.6. Effectiveness of Interventions

Significant improvements in mental health knowledge were evident in previous MHL interventions (Table 2.12) (Chow et al., 2020; Hurley et al., 2020; Breslin et al., 2018;

Hurley et al., 2018; Breslin et al., 2017a; Van Raalte et al., 2015). An increased capacity to recognise the signs and symptoms of common mental disorders has also been shown (Liddle et al., 2019; Hurley et al., 2018; Sebbens et al., 2016; Pierce et al., 2010; Bapat et al., 2009). Attitudes toward seeking help improved (Breslin et al., 2021; Chow et al., 2020; Liddle et al., 2019), while stigma was reduced (Chow et al., 2020; Kern et al., 2017; Bapat et al., 2009). Intentions or willingness to seek (Chow et al., 2020; Hurley et al., 2020; Kern et al., 2017) or provide help (Liddle et al., 2019; Breslin et al., 2018; Breslin et al., 2017a; Kern et al., 2017) and confidence to help others (Hurley et al., 2020; Hurley et al., 2018; Sebbens et al., 2016; Pierce et al., 2010; Bapat et al., 2009) have also significantly increased following a MHL intervention. Competence in self-managing mental health also improved (Breslin et al., 2021; Shannon et al., 2019). Of the studies that included a follow-up, three studies maintained their effects over 1-month (Chow et al., 2020; Hurley et al., 2018; Sebbens et al., 2016). Large effect sizes were evident in two studies (Chow et al., 2020; Hurley et al., 2018; Breslin et al., 2018), while some studies showed small (Breslin et al., 2021; Hurley et al., 2020) or small to medium effect sizes (Kern et al., 2017; Van Raalte et al., 2015) (Table 2.12). Seven studies failed to report effect size (Liddle et al., 2019; Shannon et al., 2019; Breslin et al., 2017a; Sebbens et al., 2016; Pierce et al., 2010; Bapat et al., 2009), making it difficult to examine the true effect of the significant results from the intervention on MHL.

Table 2.12 Findings of MHL interventions in athletes

Study	Significant Findings	Effect size*
Breslin et al. (2021)	Motivation, attitudes and perceived behavioural control for self-managing MH improved in the intervention group	Small to moderate (η_p^2=0.02-0.09)
Chow et al. (2020)	MHL, attitudes towards seeking help and intentions to seek counselling improved from pre- to post-intervention and to 1-month follow-up. Self-stigma reduced from pre- to post-intervention	Large (η_p^2=0.15-0.39)
Hurley et al. (2020)	Intervention group improved confidence and knowledge to assist those experiencing a MH disorder and increased likelihood of seeking professional help from pre- to post-intervention. Decreased levels of psychological distress and increased perceived support from other parents in the sport club were also evident in the intervention group.	Small (η_p^2=0.01-0.03)
Liddle et al. (2019)	Intervention participants reported significant increases in knowledge of signs and symptoms of mental illness, intentions to provide help to a friend who may experience a MH problem and attitudes that promote recognition and help-seeking.	NR
Shannon et al. (2019)	The intervention produced positive changes in competence, subsequently resulting in indirect effects on mindfulness awareness, stress and well-being	NR
Breslin et al. (2018)	MH knowledge and intentions to offer support increased for the intervention group	Moderate to large (η_p^2=0.08-0.57)
Hurley et al. (2018)	Intervention participants showed increases in depression literacy, anxiety literacy, MHL knowledge and confidence to assist an adolescent experiencing a MH disorder, which were maintained at 1-month follow-up	Moderate to large (η_p^2=0.11-0.28)
Breslin et al. (2017a)	Significant improvements in intervention group in MH knowledge and intentions to offer support	NR
Kern et al. (2017)	Stigma was reduced and participants reported increased willingness to seek help, discuss MH and identify and help teammates struggling with MH issues post-intervention	Small to medium (d=0.28-0.55)

Sebbens et al. (2016)	Increased knowledge of the signs and symptoms of common mental illnesses and increased confidence in helping someone who may be experiencing a MH problem, with changes sustained at follow-up	NR
Van Raalte et al. (2015)	Enhanced MH referral knowledge and efficacy compared to a control group	Small to moderate (η_p^2=0.04-0.10)
Pierce et al. (2010)	Significantly increased capacity to recognise mental illness and increased confidence to respond to MH difficulties in others	NR
Bapat et al. (2009)	Significant improvements in knowledge about mental disorders, increased confidence in helping someone with a mental disorder and more positive attitudes towards people with mental disorders	NR

Note: d=Cohen's d; MH=mental health; MHL=mental health literacy; η_p^2=partial eta-squared; NR=not reported; *interpreted according to Cohen's classification (Cohen, 1988)

2.7.4 MHL Measures

A wealth of measures have been utilised in previous research to examine MHL and help-seeking (Table 2.11). For the purpose of this literature review, a thorough analysis of measures examining MHL will be explored and will be reported as recognition, knowledge, attitude or combined assessment measures.

2.7.4.1. Recognition Measures

Recognition measures assess respondents' knowledge of mental health disorders based on the criteria outlined in the DSM-V (O'Connor and Casey, 2015). When assessing recognition as a component of MHL, research focuses on the most common mental disorders, with anxiety and depression literacy two key recognition measures.

2.7.4.1.1. Anxiety and Depression Literacy

The Anxiety Literacy (A-Lit) (Appendix K) (Gulliver et al., 2012b) and Depression Literacy (D-Lit) (Appendix L) (Griffiths et al., 2004) questionnaires each contain 22-items and are used to assess disorder specific knowledge and attitudes. Respondents rate items as true, false or I don't know. One point is given for a correct response, with total scores ranging from 0 to 22. Higher scores indicate greater anxiety or depression literacy. Detailed description of the development of the measures has not been reported by the authors. A-lit and D-lit have been shown to have adequate internal consistency in elite (α=0.70-0.76) (Gulliver et al., 2012b) and adolescent athletes (α=0.62-0.63) (Liddle et al., 2019) and parents of adolescents in community sports clubs (α=0.73-0.74) (Hurley et al., 2020). Test-retest reliability of A-Lit (r=0.83; P=0.003) and D-Lit (r=0.71; P=0.02) has also been shown (Gulliver et al., 2012b).

2.7.4.2. Knowledge Measures

Knowledge measures assess multiple components; how to seek mental health information, risk factors and causes and self-treatments and professional help available (O'Connor and Casey, 2015). The Mental Health Knowledge Schedule is one measure that has examined knowledge when examining MHL in previous research.

2.7.4.2.1. Mental Health Knowledge Schedule

The Mental Health Knowledge Schedule (MAKS) (Appendix M) is a 12-item measure composed of two stigma-related subscales (Evans-Lacko et al., 2010). The first subscale measures mental health knowledge of help-seeking behaviours, recognition, support, employment, treatment and recovery while the second subscale assesses knowledge of

mental health conditions. Each subscale is composed of six items and is rated using an ordinal scale ranging from 1 (strongly disagree) to 5 (strongly agree). An additional response of 'Don't know' was added, which is coded as neutral (i.e., score of 3 representing neither agree nor disagree). Items 6, 8 and 12 are reverse scored and a total score is determined by summing the six item responses. Scores range from 12 to 60 and higher scores indicate greater mental health knowledge and recognition of mental illnesses. Initial measure items were generated following an extensive literature review and were thus, reviewed by an expert panel to ensure items were comprehensive while also assessing content and face validity. A pre-pilot examination of the measure was conducted among a sample of the general population to clarify wording, comprehensibility and response format before finalisation of the measure and examination of the psychometric properties (Evans-Lacko et al., 2010). Items were shown to have moderate internal consistency (α=0.54-0.69) (Evans-Lacko et al., 2010). Item retest reliability, when measured using weighted kappa, showed moderate to substantial agreement over one week (κ=0.57-0.87) (Evans-Lacko et al., 2010).

2.7.4.3. Attitude Measures

Attitude measures are utilised to assess respondents' attitudes that promote recognition of mental health issues and appropriate help-seeking (O'Connor and Casey, 2015). Attitudes Towards Seeking Professional Psychological Help, Stigma Scale for Receiving Psychological Help, Self-Stigma of Seeking Help and Inventory of Attitudes Toward Seeking Mental Health Services are measures used to assess attitude as a component of MHL.

2.7.4.3.1. Attitudes Towards Seeking Professional Psychological Help

Attitudes Towards Seeking Professional Psychological Help (ATSPPH) is a 29-item measure assessing the degree to which respondents agree with statements related to help-seeking from a mental health professional (Fischer and Turner, 1970). Items are rated on a 4-point Likert-type scale ranging from 0 (disagree) to 3 (agree). Eighteen items are reverse scored, with scores ranging from 0 to 87. Greater scores indicate more favourable attitudes to seeking professional help. Development of the measure was conducted in collaboration with clinical psychologists who suggested 47 preliminary statements, which were subsequently analysed by a further group of clinical and counselling psychologists and psychiatrists, and 31-items were deemed relevant. The preliminary measure was

administered to two student cohorts in addition to a measure of social desirability. The results indicated two items were correlated with social desirability and thus were removed, with the remaining 29-items considered for the ATSPPH. Factor analyses identified four factors of attitudes of the ATSPPH; recognition of need for professional psychological help (8 items), stigma tolerance (5 items), interpersonal openness (7 items) and confidence in mental health professionals (9 items) (Fischer and Turner, 1970). ATSPPH was shown to have good internal consistency (α=0.83-0.86), with test-retest reliability over five days (r=0.86), two weeks (r=0.89), four weeks (r=0.82) and two months (r=0.84) (Fischer and Turner, 1970).

A subsequent modernised 10-item unidimensional version of the measure (ATSPPH-SF) (Appendix N) was adapted from the original measure (Fischer and Farina, 1995). The shortened version retained 14 items with the largest item-total score correlations, which were subsequently factor analysed, resulting in an optimal two-factor solution (Fischer and Farina, 1995). One of these factors, made up of 10-items, was retained to provide a unidimensional measure of treatment attitudes (Fischer and Farina, 1995). However, further investigation and factor analysis identified a two-factor model: openness to seeking treatment for emotional problems and value and need in seeking treatment (Elhai et al., 2008). The unidimensional nature of the measure was further disputed by Picco et al. (2016) who identified three distinct dimensions in ATSPPH-SF through exploratory and confirmatory factor analyses, comprising of openness to seeking professional help, value in seeking professional help and preference to cope on one's own. Similar to the original measure, items are rated on a 4-point Likert-type scale ranging from 0 (disagree) to 3 (agree). Items 2, 4, 8, 9, and 10 are reverse scored and scores from all 10 responses are summed. Total scores range from 0 to 30 with higher scores indicating more positive attitudes toward seeking professional psychological help. Internal consistency of ATSPPH-SF was evident (α= 0.83) (Fischer and Farina, 1995), which was also shown in athletes (α=0.69-0.75) (Hilliard et al., 2019a; Hilliard et al., 2019b; Gulliver et al., 2012b; Steinfeldt and Steinfeldt, 2010) and collegiate students (α=0.77-0.84) (Pedersen and Paves, 2014; Topkaya, 2014; Elhai et al., 2008; Vogel et al., 2006; Vogel et al., 2005; Komiya et al., 2000). One month test-retest reliability has also been shown in elite athletes (r=0.64) (Gulliver et al., 2012b) and collegiate students (r=0.80) (Komiya et al., 2000).

The correlation between the original 29-item ATSPPH and 10-item ATSPPH-SF was 0.87 (Fischer and Farina, 1995), indicating both measures assess similar constructs.

2.7.4.3.2. Stigma Scale for Receiving Psychological Help

Stigma Scale for Receiving Psychological Help (SSRPH) (Appendix O) is a 5-item unidimensional measure designed to measure respondent's perceived stigma towards seeking professional mental health treatment (Komiya et al., 2000). Items are rated using a 4-point Likert scale ranging from 0 (strongly disagree) to 3 (strongly agree) and total scores can range from 0 to 15. Higher scores indicate greater perceived stigma associated with receiving professional psychological treatment. Five items for the measure were developed by Komiya et al. (2000) and content validity was confirmed by psychological experts. Factor analysis strongly identified the existence of one factor within the measure, with the single factor accounting for an estimated 100% of the variance in SSRPH (Komiya et al., 2000). Internal consistency of SSRPH (α=0.72) was originally identified by Komiya et al. (2000) and was also highlighted in athletes (α=0.65-0.81) (Hilliard et al., 2019a; Wahto et al., 2016; Steinfeldt et al., 2009), collegiate students (α=0.71-0.79) (Topkaya, 2014; Vogel et al., 2008; Vogel et al., 2006; Vogel et al., 2005) and a mixed sample of collegiate athletes and non-athletes (α=0.72) (Hilliard et al., 2019b). Evidence of construct validity was highlighted in the negative correlation evident between SSRPH and ATSPPH-SF ($r=-0.40$; $P<0.001$), indicating the greater the perceived social stigma the less positive the individual feels about seeking professional psychological help (Komiya et al., 2000).

2.7.4.3.3. Self-Stigma of Seeking Help

Self-Stigma of Seeking Help (SSOSH) (Appendix P) is a 10-item measure used to assess a respondents negative views toward themselves for seeking psychological help (Vogel et al., 2006). Items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items 2, 4, 5, 7 and 9 are reverse scored with all 10-items summed to give a total score. Total scores range from 10 to 50 with higher scores indicating greater levels of self-stigma. Development of the measure involved the creation of 28 items, with the clarity and readability of the items examined among collegiate students (Vogel et al., 2006). Content validity was subsequently examined by experts and three items were deemed inadequate at measuring the self-stigma associated with help-seeking, resulting in the development of a 25-item measure. A further sample of collegiate students (N=583)

completed the measure rating the degree to which each item described how they might react if they faced problems for which they were considering seeking help (Vogel et al., 2006). The corrected item-total correlation was examined for each item, resulting in the final 10-item measure. The 10-item measure, five positively worded and five reverse-keyed items, was deemed to be an adequate measure of the breadth of domains intended to be measured by the measure without being excessively long (Vogel et al., 2006).

SSOSH was shown to have good internal consistency (α=0.86-0.91) (Vogel et al., 2006), which was also identified in student athletes (α=0.71-0.84) (Hilliard et al., 2019a; Bird et al., 2020; Wahto et al., 2016; Steinfeldt and Steinfeldt, 2012), a mixed cohort of student athletes and non-athletes (α=0.86) (Hilliard et al., 2019b), collegiate students (α=0.81) (Bird et al., 2020; Topkaya, 2014) and the general population (α=0.77-0.89) (Vogel et al., 2013). Test-retest reliability of the measure was also confirmed (r=0.72) (Vogel et al., 2006). Factor analysis resulted in the extraction of one factor, indicating SSOSH is a unidimensional measure examining a single construct (Vogel et al., 2006). SSOSH was also shown to have construct, criterion and discriminant validity (Vogel et al., 2006).

2.7.4.3.4. Inventory of Attitudes Toward Seeking Mental Health Services

Inventory of Attitudes Toward Seeking Mental Health Services (IASMHS) (Appendix Q) (Mackenzie et al., 2004) is a 24-item measure used to examine general attitudes about seeking professional psychological help. Items are rated on a 5-point Likert scale from 0 (disagree) to 4 (agree), with total scores ranging from 0 to 96. Higher scores indicate more positive attitudes toward mental health help-seeking. The measure was developed by modifying ATSPPH, as Mackenzie et al. (2004) identified issues related to the rating measure, subscales, factor structure and sample misrepresentation of ATSPPH. The original 4-point Likert rating scale was replaced with a 5-point scale and wording changes were implemented that involved replacing gender-specific language with gender-neutral pronouns, the generic term ‘professional’ replaced the use of ‘psychiatrist’ or ‘psychologist’ and ‘psychological problems’ replaced several terms related to mental health problems to allow for greater consistency. Additional items were also added to account for two new constructs; knowledge of subjective norms (N=6) and perceived behavioural control (N=6), resulting in the development of a 41-item measure. Item-total correlations, internal reliability and factor loadings were examined in the general

population, which resulted in the deletion of 17 items and a final 24-item measure was developed. Factor analysis identified three factors: psychological openness, help-seeking propensity and indifference to stigma (Mackenzie et al., 2004).

The 24-item measure was shown to have good internal consistency (α=0.87) among a community sample, with the psychological openness (α=0.82), help-seeking propensity (α=0.76) and indifference to stigma (α=0.79) subscales also shown to have good internal consistency (Mackenzie et al., 2004). Internal consistency has also been shown among elite athletes (α=0.86) (Jones, 2016), collegiate athletes (α=0.88) (Wahto et al., 2016) and a mixed sample of collegiate student athletes and non-athletes (α=0.89) (Yousaf et al., 2015). Test-retest reliability was shown over 3-weeks in collegiate athletes for both the IASMHS (r=0.85; P<0.01) and subscales (r=0.64-0.91; P<0.01) (Mackenzie et al., 2004). Criterion validity of the measure was also identified in collegiate students and a community sample (Mackenzie et al., 2004). The three subscale factors were shown to be positively correlated with one another (r=0.37-0.47) (Mackenzie et al., 2004). Factor analysis was also conducted among a collegiate sample, which showed positive correlations between factors (r=0.26-0.43) (Mackenzie et al., 2004).

2.7.4.4. Combined Measures

Individual measures assessing recognition, knowledge and attitudes were reported in Sections 2.7.4.1 to 2.7.4.3. However, measuring MHL through one assessment tool may provide a methodologically robust and time-efficient measure of MHL (O'Connor and Casey, 2015). The Mental Health Literacy Scale and Multicomponent Mental Health Literacy Measure are two key measures used to assess all components of MHL.

2.7.4.4.1. Mental Health Literacy Scale

The Mental Health Literacy Scale (MHLS) (Appendix R) is a 35-item measure used to assess seven attributes of MHL; the ability to recognise specific disorders, knowing how to seek mental health information, knowledge of risk factors and causes, knowledge of self-treatments, knowledge of professional help available and attitudes that promote recognition and appropriate help-seeking (O'Connor and Casey, 2015). Items are rated using three Likert scales. The ability to recognise disorders, knowledge of risk factors and causes and knowledge of professional help available are measured using a 4-point scale ranging from 1 (very unlikely) to 4 (very likely). Knowledge of self-treatment is measured

using a 4-point scale ranging from 1 (very unhelpful) to 4 (very helpful). Knowledge of where to seek information and nine of the items of attitudes that promote recognition or appropriate help-seeking behaviour are rated using a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The final seven items of attitudes that promote recognition or appropriate help-seeking behaviour are rated on a 5-point scale ranging from 1 (definitely unwilling) to 5 (definitely willing). Items 10, 12, 15 and 20-28 are reverse scored. A total score is achieved by summing all items, with total scores ranging from 35 to 160. Higher scores indicate greater MHL.

The measure was developed with a clinical panel of experts, where 79 items were created and pilot tested in a community sample (N=202) (O'Connor and Casey, 2015). The items were reduced following analysis, resulting in 51 items and additional pilot testing was conducted among collegiate students (N=372) and mental health professionals (N=43). Further reduction of the number of items resulted in the final 35-item MHLS, measuring the ability to recognise disorders (N=8), knowledge of where to seek information (N=4), knowledge of risk factors and causes (N=2), knowledge of self-treatment (N=2), knowledge of professional help available (N=3) and attitudes that promote recognition or appropriate help-seeking behaviour (N=16). MHLS was shown to have adequate internal consistency (α=0.87) (O'Connor and Casey, 2015), which has also been shown in collegiate athletes (α=0.82-0.92) (Chow et al., 2020). Knowledge of Where to Seek Information (α=0.73) and Attitudes that Promote Recognition (α=0.83) subscales were shown to be reliable among adolescent athletes (Liddle et al., 2019). Test-retest reliability over 2-weeks has also been shown (r=0.797; P<0.001) (O'Connor and Casey, 2015).

2.7.4.4.2. Multicomponent Mental Health Literacy Measure

The Multicomponent Mental Health Literacy Measure (MMHLM) (Appendix S) is a 26-item measure used to examine knowledge, beliefs and resource-oriented MHL (Jung et al., 2016). The knowledge and beliefs-oriented MHL subscales (items 1-22) are responded to using a 5-point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree) with a further option of 'I don't know'. For the analysis, respondents scoring an item 'strongly agree' or 'agree' are coded as 1 as they were deemed to have MHL while those scoring an item 'strongly disagree', 'disagree', 'neutral' or 'I don't know' were coded as 0 with the belief they did not have adequate MHL. The response

format for the final 4 items, the resource-oriented subscale, is ‘yes’ (coded 1) or ’no’ (coded 0). Total scores can range from 0 to 26 and higher scores indicate greater MHL.

A literature review of the knowledge of and beliefs about mental illness, treatment and resources generated the initial 32-item measure and content validity was confirmed by a panel of experts (Jung et al., 2016). Instructions and clarity of the items and the level of difficulty and feasibility of the measure were examined in a pilot study, which resulted in a final measure containing 30-items. An exploratory factor analysis was conducted, indicating correlation between two items, which were removed. A subsequent exploratory factor analysis identified a three factor model; 12 knowledge-oriented, 10 belief-oriented and 4 resource-oriented items. Two items were deemed as poorly functioning as they were cross-loaded in multiple factors and were removed. Confirmatory factor analysis confirmed the construct validity of MMHLM (Jung et al., 2016). MMHLM (α=0.83) and each subscale (α=0.76-0.84) were shown to have good internal consistency (Jung et al., 2016). Known groups and convergent validity analyses were also conducted, which supported the validity of the MMHLM (Jung et al., 2016). Further analysis of the measure among an athletic population identified poor fit of the model to the data and poor construct validity of the measure (Sullivan et al., 2021). Further exploratory and confirmatory factor analyses were conducted resulting in a 14-item re-defined measure with a three-factor solution suitable for use with athletic populations (Sullivan et al., 2021). Reliability analysis among an athletic population confirmed good internal consistency of the modified 14-item measure (α=0.65) (Sullivan et al., 2021).

2.7.5. Considerations for Intervention Design

MHL programmes for athletes should address athlete-specific and general risk factors that can increase the risk of experiencing mental health issues and provide detailed knowledge of signs and symptoms of mental ill-health, how and where to seek help and self-management techniques (Gorczynski et al., 2020a; Purcell et al., 2019). MHL programme content must be sports-specific (Purcell et al., 2019), designed with collective awareness of all stakeholders and account for contextual (e.g., culture, developmental age, family, gender) and organisational factors (e.g., feasibility, length of time, service user experience) (Gorczynski et al., 2020a; Gorczynski et al., 2019; Breslin et al., 2019b). Intervention design needs to be evidence-based and underpinned by an appropriate theory

to ensure the evaluation of programmes are guided by theoretical behaviour change principles (Gorczynski et al., 2020a; Gorczynski et al., 2019; Breslin et al., 2019b). The design must also be cognisant of local resources and based on sound pedagogical principles (Gorczynski et al., 2020a). It is important that interventions promote organisational change and do not attempt to overwhelm individuals with education and communication strategies where they are expected to take full responsibility for their mental wellbeing (Gorczynski et al., 2020a). In addition, sport psychologists with an appropriate level of training need to be involved in the design, delivery and evaluation of MHL interventions (Gorczynski et al., 2020a; Breslin et al., 2019b). Mental health awareness may be promoted through the use of sporting analogies and supporting socially relatable and identifiable personalities (Cooper et al., 2015). Interventions aimed at stigma-reduction should consider utilising athlete role models to convey information and address stereotypes (Clement et al., 2015). The effectiveness of an intervention needs to be measurable, with the impact assessed using psychometrically validated, theory-informed and context-appropriate measurement tools (Gorczynski et al., 2020a; Breslin et al., 2019b). For methodological rigour, researchers must consider reporting effect sizes and determining adequate sample size and power (Breslin et al., 2019b).

2.7.6. Summary of MHL Interventions

MHL is essential for improved mental health and is particularly important for athletes exposed to stressors that can initiate or exacerbate mental health issues. The literature presented highlights a number of MHL interventions that have been implemented with athletes, coaches, parents and sports staff. However, no interventions to date have been designed or implemented with Gaelic footballers. Appropriate MHL interventions specifically addressing barriers and facilitators to help-seeking acknowledged by Gaelic footballers are necessary and may be an important initial step in improving the mental health of Gaelic footballers playing at elite and sub-elite levels.

2.8 Summary of Literature Review

Following a comprehensive review of the available literature, there is a clear need for research into the psychological effect of musculoskeletal injury in Gaelic footballers. The psychological response to injury is often neglected with a particular dearth of evidence examining the psychological response of adolescents to injury. In addition, there is

uncertainty of the incidence of injury among young adolescent Gaelic footballers, with prior research focus on the prevalence of injury in older male adolescent Gaelic footballers (O'Connor et al., 2016a). Injury prevention, treatment and rehabilitation strategies are devised, implemented and justified according to the prevalence of injury and the strength of the relationship between injury causation factors and injury risk factors (Fuller and Drawer, 2004; Van Mechelen et al., 1992). Therefore, the importance of sound epidemiological research designs with valid methodologies is important (Brooks and Fuller, 2006). The current dearth of epidemiological research regarding Gaelic football injuries in adolescents highlights the need for additional well-designed descriptive epidemiological studies.

Even with accessible and proficient healthcare, there is a reluctance towards the use of mental health services when experiencing mental health issues (Rickwood and Thomas, 2012) with athletes showing marked reluctance to access mental health services (Watson, 2005). Avoidance of psychological help-seeking will continue to be a problem in current sport practices as long as the perceived risks outweigh the benefits (Vogel et al., 2007a). Current research is needed to examine the reluctance of Gaelic footballers to seek professional psychological help, as the barriers and facilitators to mental health help-seeking following injury are unclear. Identification and comprehensive understanding of factors influencing help-seeking may facilitate the development of appropriate interventions.

Prevention programmes are essential for athletes at-risk of experiencing impaired mental health (Purcell et al., 2019), particularly following injury. By equipping players with the necessary skills to manage their mental health, early detection of symptoms of mental health disorders and referral to the appropriate health professional may be facilitated (Purcell et al., 2019). Theory-informed mental health interventions can improve the self-management of mental health in those with simultaneous academic, social and sporting demands (Donohue et al., 2013), as is evident in Gaelic footballers who balance the extensive demands of sports participation with demands of their professional and personal lives (Kelly et al., 2018). Thus, MHL interventions addressing the barriers and facilitators to help-seeking in Gaelic footballers are necessary to promote mental health and aid players experiencing issues following injury.

Chapter 3. The Epidemiology of Musculoskeletal Injury in Male Adolescent Gaelic Footballers

3.1 Abstract

Background: Gaelic football participation is associated with an inherent risk of musculoskeletal injury, which can lead to physical, psychological and financial consequences. Despite its popularity as the most commonly played club sport among male adolescents in Ireland, there is a dearth of Gaelic football injury epidemiological research in young adolescents.

Aim: To prospectively examine the epidemiology of musculoskeletal injury over one season in male adolescent Gaelic footballers.

Methods: Male adolescent Gaelic footballers (N=97; 13.4±1.1 years) were recruited from under-14 and under-16 Gaelic football sub-elite teams. Injuries, defined as those sustained during training or competition resulting in restricted performance or time loss from play, were assessed and recorded by a Certified Athletic Therapist using a standardised injury report form. Written training diaries recording exposure to sport and physical activity were completed weekly for the duration of the season (15.2±8.9 weeks).

Results: One-fifth of male adolescents experienced an injury during the season, with 21.4 injuries recorded per 1000 participation hours. Match injuries (44.4 injuries per 1000 hours) were significantly more prevalent than training injuries (8.4 injuries per 1000 hours). Acute, lower extremity injuries to muscle and ligament were most common, particularly in the hamstring, ankle, hand and fingers. The dominant limb sustained the majority of injuries, while injuries were predominantly minor. Sprinting was the most commonly noted mechanism of injury.

Conclusion: Effective injury prevention programmes are necessary to reduce the incidence of injury in male adolescent Gaelic footballers. Implementing injury prevention measures in adolescents may reduce players' risk of injury as they progress to adult Gaelic football participation and may subsequently, reduce player dropout, improve team success and promote life-long sport participation.

3.2 Introduction

Youth sport and physical activity participation is associated with a wealth of incontrovertible physical and psychosocial benefits (Brunet et al., 2013; Eime et al., 2013; Merkel, 2013), with Gaelic football regarded as the most popular club sport among Irish male adolescents (Murphy et al., 2017). Despite the wealth of associated benefits, an inherent risk of injury exists (Caine et al., 2008). Injury can result in pain, discomfort, loss of function, time absent from school, work or sport, considerable medical expenses and treatment costs along with placing undue pressure on accident and emergency services and hospital staff (Murphy et al., 2012; Junge and Dvorak, 2000). Injury surveillance is essential to establish the extent of the injury problem and is regarded as the crucial first step in injury prevention (Roe et al., 2017; Van Tiggelen et al., 2008; Finch, 2006; Van Mechelen et al., 1992).

Injury surveillance can allow for the identification of injury incidence and the type, nature, location and severity of Gaelic football injuries, which can provide essential, meaningful information to players, parents, coaches and sports medicine clinicians, while also informing injury prevention strategies (Newell et al., 2006). Appropriate injury prevention strategies may effectively reduce the occurrence and magnitude of the effects of injury (Lauersen et al., 2014; Meeuwisse et al., 2007). Injury epidemiological research must standardise the definition of injury and data collection and reporting methods to efficiently examine the injury problem in Gaelic football.

Epidemiological research to date has begun to identify the incidence and characteristics of injury in older male adolescent Gaelic footballers (O'Connor et al., 2016a) and school Gaelic football teams (Watson, 1996). Injuries have also been examined in elite (Roe et al., 2018a; Murphy et al., 2012; Newell et al., 2006; Cromwell et al., 2000) and sub-elite adult Gaelic footballers (O'Connor et al., 2017; Crowley et al., 2011; Wilson et al., 2007). This research has highlighted injuries are prevalent in Gaelic football, with 4.9 to 7.1 injuries occurring per 1000 participation hours in adolescents (O'Connor et al., 2016a; Watson, 1996) and 8.3 to 13.5 injuries per 1000 hours recorded in adults (Roe et al., 2018a; O'Connor et al., 2017; Murphy et al., 2012; Crowley et al., 2011; Wilson et al., 2007; Newell et al., 2006; Cromwell et al., 2000). However, there is a lack of research examining injury epidemiology in younger Gaelic footballers, particularly those under 16

years. Therefore, this study aimed to establish the incidence and characteristics of musculoskeletal injury in young male adolescent Gaelic footballers.

3.3 Methodology

3.3.1. Participants

Ninety-seven male adolescent Gaelic footballers (13.4±1.1 years) that played at under-14 (N=66) and under-16 (N=31) level were conveniently recruited from three sub-elite Gaelic football teams in county Westmeath. The inclusion criteria required participants to be an adolescent male, Gaelic footballer and member of a recruited under-14 or under-16 sub-elite Gaelic football team. The chairperson of each club was contacted by email and a follow-up phone call was made to outline the purpose of the study, what was involved, what was required from the club and players and to request permission to recruit participants at the club. When approval was granted, under-14 and under-16 team managers were contacted. The primary researcher held an information session for adolescents and their parents/guardians at the club at the beginning of the season outlining the purpose of the study and the risks and benefits associated with participation. Participants were issued a Plain Language Statement (Appendix T) and given an opportunity to review it and ask any questions. Parental/guardian consent and participant assent were granted by signing an Informed Consent Form (Appendix T). Ethical approval was granted by the AIT Research Ethics Committee (#20161125).

3.3.2. Procedure

3.3.2.1. Baseline Testing

At the beginning of the season, demographic information (date of birth, height, weight, body mass index (BMI), leg and hand dominance), current physical activity participation and injury history were collected using a pre-participation questionnaire (Appendix U). Height was recorded to the nearest 0.1cm using a portable stadiometer (Leicester Portable Height Measure, Seca, Hamburg, Germany) and body mass was measured to the nearest 0.1kg using a calibrated weighing scale (Seca 760 scale, Seca, Hamburg, Germany). Footwear was removed for both measurements. BMI was calculated using Equation 3.1. Hand dominance was recorded as the hand used to write with (Schneiders et al., 2011), with leg dominance noted as the leg preferentially used to kick a football (Munro and Herrington, 2011). Current physical activity participation was recorded, including sport

or activity involved in, average hours of participation per week, years and months involved in the sport and playing level. Participants also reported injury history, documenting injuries sustained in the previous 12 months and their characteristics (Table 3.1) Injury history was recorded solely for the previous 12 months to minimise recall errors associated with the collection of retrospective injury data (Gabbe et al., 2006).

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height}^2\ (\text{m}^2)}$$

Equation 3.1 BMI calculation

Table 3.1 Information captured by the injury history questionnaire

Injury occurrence (Yes/No)
Number of injuries sustained
Injury sustained (e.g., ankle sprain, hamstring strain)
Recurrence of injury (Yes/No and duration between occurrences)
Treatment received (hospital/A&E, GP, Certified Athletic Therapist, chartered physiotherapist, other)
Need for imaging/surgery (Yes/No)
Time loss from sport and school (Yes/No and number of days missed)
Rehabilitation completed (Yes/No)
Adequate rehabilitation completed (Yes/No and if not, why?)
Return to activity too early (Yes/No)
Pressure to return to play (Yes/No and if so, from self, coach, parent(s) or other?)
Impact of injury on performance (similar or improved compared to pre-injury?)

Note: A&E=accident and emergency department; GP=general practitioner

3.3.2.2. In-Season Testing

The primary researcher, a Certified Athletic Therapist, attended weekly Gaelic football training sessions for each team over for one entire season (15.2±8.9 week duration). All data collection took place in a dressing room at the club. A written self-recall training diary (Appendix V), adapted from a validated training diary (O'Connor et al., 2016b), was completed by all participants present at weekly training sessions during the season. Completion of the training diary was explained to each participant at the beginning of the season. The weekly training diary documented the sport or physical activity involved in,

the type of participation (training, match or competition), level played at (club, school, county, provincial or national), duration of each session (actual time in minutes spent by the participant in physical activity) and whether injury occurred.

Any player that sustained an injury in the previous week reported to the Certified Athletic Therapist, who was present at one training session per week, with injury defined as any injury sustained during training or competition resulting in restricted performance or time loss from play (O'Connor et al., 2016a). An injury assessment was conducted and recorded using an injury report form (Appendix W), developed from a similar report form recording injuries in adolescent Gaelic footballers (O'Connor et al., 2016a). The injury report form (Table 3.2) recorded the injury characteristics, mechanism and diagnosis and included a visual analogue scale (VAS) from 0 to 10 (Haefeli and Elfering, 2006), which measured subjective pain at the time of injury and at the time of injury assessment. Injuries that required the participant to miss time from Gaelic football participation were classed as time-loss injuries, whereas non-time-loss injuries were those that did not require the participant to miss time from Gaelic football. Injury severity was defined according to number of days missed from participation; minor (<7 days), moderate (7-21 days) or severe (>21 days) (O'Connor et al., 2016a). The time when an injury was sustained was recorded for match and training injuries. Matches, as set out by the GAA at under-14 and under-16 levels, were 60 minutes in duration whereas training duration varied between teams, ranging from 60 to 90 minutes. In the description of the nature of an injury, the term growth-related issue was utilised to describe injuries that occurred specifically to the growing skeleton due to the susceptibility of growth cartilage to injury from repetitive loading and the increased risk for injury associated with the adolescent growth spurt (DiFiori, 2010), such as epiphyseal injury or bony apophysitis.

3.3.3. Statistical Analysis

Data were analysed using Microsoft Excel 2016 (Microsoft Corporation, Redmond, Washington, USA) and IBM SPSS (version 24: IBM, New York, USA). Descriptive statistics (mean and standard deviation or frequency) were determined for demographic information and current physical activity participation. Injury history characteristics, including frequency, location, nature and treatment choice, were also examined. Injury incidence proportion (IP), repeat incidence proportion (RIP) and incidence rate (IR) (as

defined in Table 3.3) were calculated, along with 95% Confidence Intervals (95% CI), determined using Equation 3.2 according to a Poisson distribution. IP was substituted by RIP and IR for each subsequent 95% CI calculation. Injury characteristics, including onset, side, location, nature, severity, mechanism, time and factors surrounding the injury (volume of sports participation), were determined for injuries sustained over the season. In addition, the Gaelic football season was divided into four phases; early (weeks 2–7), mid (weeks 8–14), mid-to-late (weeks 15–21) and late season (weeks 22– 28). IP, RIP and IR were calculated for each season phase.

Table 3.2 Information captured by the injury report form

Sport/activity injury sustained in
Type of competition (training/match)
Team injured with (club/county/school)
Playing surface (grass/astro turf/3G pitch)
Time when injured (in minutes)
VAS pain rating (0 to 10, at time of injury and injury assessment)
Injury location (right/left/central/bilateral)
Type of mechanism (acute/chronic/overuse)
Onset of injury type (new/recurrent)
If recurrent, when was previous onset?
Any time loss from play/school as a result of that recurrent injury? (number of days)
Rehabilitation/recovery time? (number of days)
Protective equipment
Injured body part (e.g., shoulder, hip, knee, ankle etc.)
Mechanism of injury (e.g., sprinting, contact with ball etc.)
Type of injury (e.g., muscle strain, ligament sprain, bone fracture etc.)
Injury diagnosis (e.g., grade 2 biceps femoris strain etc.)
Referral advised
Referral type advised (GP/hospital/Certified Athletic Therapist/physiotherapist/scan)

$$\text{Lower Confidence Interval} = \frac{\text{Incidence Proportion}}{e^{x}\left(\frac{1.96}{\sqrt{\text{Number of injuries}}}\right)}$$

$$\text{Upper Confidence Interval} = \text{Incidence Proportion} * \left(e^{x}\left(\frac{1.96}{\sqrt{\text{Number of injuries}}}\right)\right)$$

Equation 3.2 95% Confidence Interval Calculation

Table 3.3 Calculations and definitions used in reporting injury incidence (Knowles et al., 2006)

Injury Incidence Measure	Definition	Calculation
Incidence Proportion (IP)	The average risk of injury per athlete	IP = Number of injured participants during a specified time* / Number of participants at risk during a specified time
Repeat Incidence Proportion (Repeat IP)	The average risk of sustaining a repeat injury per athlete	Repeat IP = Number of repeat injured participants during a specified time / Number of injured participants during a specified time
Incidence Rate (IR)	The incidence of injury per unit of athlete time, expressed per 1000 total exposure hours, 1000 training hours and 1000 match hours	IR = Number of injuries / Total hours playing sport x 1000 Training IR = Number of injuries in training / Total hours training x 1000 Match IR = Number of injuries in matches / Total hours playing matches x 1000

Note: *where the number of injured athletes is defined as the number of athletes who sustain at least 1 injury, even if a participant receives numerous injuries they are only counted as one injured participant

3.4 Results

3.4.1. Baseline Testing

Table 3.4 outlines demographic information for the 97 recruited male adolescents, who had been Gaelic football participants for 6.2±2.1 years. The majority of participants took part in another sport outside Gaelic football (70.1%), with multi-sport participation occurring simultaneous to the Gaelic football season. Soccer (46.4%) was the most frequently played other sport, followed by rugby (14.4%), swimming (11.3%), hurling (9.3%), hockey, golf, basketball (all 5.2%), athletics, sailing (both 3.1%), gym, badminton (both 2.1%), cycling and horse-riding (both 1.0%).

Table 3.4 Participant demographic information

	All Participants (N=97)	Under-14 (N=66)	Under-16 (N=31)
		M (SD)	
Age (years)	13.4 (1.1)	12.8 (0.6)	14.7 (0.4)
Height (m)	1.6 (0.1)	1.6 (0.1)	1.7 (0.1)
Weight (kg)	59.3 (12.6)	53.5 (10.6)	71.5 (5.8)
BMI (kg/m^2)	21.7 (3.3)	20.6 (3.1)	24.2 (2.2)

Note: BMI=body mass index; kg=kilograms; kg/m^2=kilograms per metres squared m=metres; N=number of participants; SD=standard deviation

3.4.1.1. Injury History

Examination of injury history identified 54.6% of participants sustained an injury in the previous 12 months, with 21.6% reporting two or more injuries. Hamstring (22.6%) and ankle (18.9%) were most frequently injured (Table 3.5) and injuries occurred to muscle (39.6%), ligament (26.4%), bone (24.5%), tendon (5.7%), cartilage (1.9%) and other (1.9%). Strains (39.6%), sprains (26.4%) and fractures (20.8%) were most common, followed by tendinopathy (3.8%), growth-related issues (5.7%), contusion (1.9%) and concussion (1.9%). Figure 3.1 provides a visual representation of the distribution of the different nature of injuries in each injured body part. Of the 53 participants who sustained an injury in the previous 12 months, 71.7% received treatment for their injury. Treatment from a healthcare professional was the most common treatment choice (42.1%), followed by hospital/A&E (31.6%), GP (21.1%) and pharmacist (5.3%).

Table 3.5 Body part injured in the previous 12 months

Body Part	N	%
Hamstring	12	22.6
Ankle	10	18.9
Hand and fingers	6	11.3
Hip/groin	6	11.3
Wrist	3	5.7
Calf/Achilles	3	5.7
Knee	3	5.7
Leg/foot	3	5.7
Collarbone	3	5.7
Back	2	3.8
Quadriceps	1	1.9
Head	1	1.9

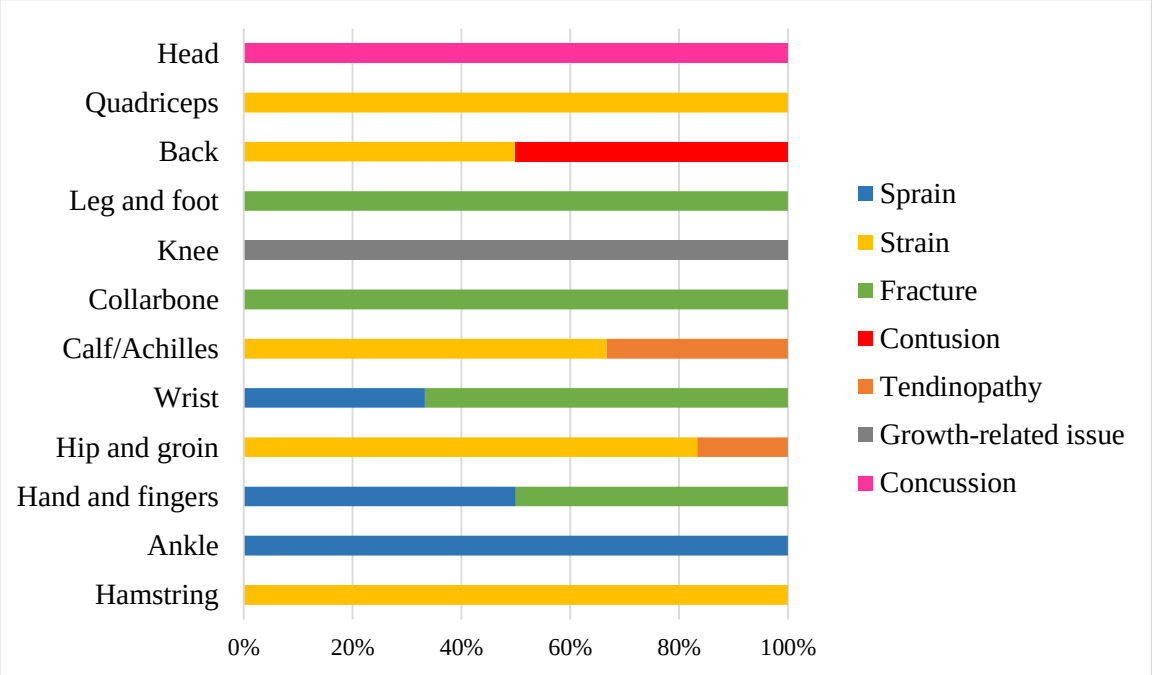

Figure 3.1 Nature of previous injuries sustained

3.4.2. Gaelic Football Injury Incidence

Twenty-two injuries occurred over the season in 97 adolescents. Four injuries resulted in time-loss from play, with 18 non-time-loss injuries. Of all injuries, 63.6% were sustained in matches (N=14) and 27.3% in training (N=6), whereas 9.1% had a gradual onset (N=2). Total exposure time for adolescents participating in Gaelic football during the season was 1026.6 hours, with 315.4 hours in matches and 711.2 hours in training. Incidence

proportion indicated that 20.6% (95% CI=13.4-31.6) of male adolescent players became injured, while repeat incidence proportion indicated that 4.8% (95% CI=0.7-34.1) of those who sustained an injury also suffered a subsequent injury. The incidence of injury was 21.4 injuries per 1000 hours (95% CI=14.1-32.5). Match injuries (44.4 injuries per 1000 hours) (95% CI=26.3-75.0) were significantly more common than training injuries (8.4 injuries per 1000 hours) (95% CI=3.8-18.8) (Table 3.7). Injury incidence was greatest during the mid-to-late season (29.0 injuries per 1000 hours; 95% CI=15.6-53.9) (Table 3.6).

3.4.3. Injury Profile

3.4.3.1. Type, Nature and Location of Injury

The majority of injuries had an acute onset (81.8%), while overuse injuries were also evident (18.2%). Overall, 90.9% of all injuries were a new occurrence and 9.1% were a recurrent presentation of a previous injury. Injuries predominantly occurred to the lower extremity (68.2%; 14.6 injuries per 1000 hours; 95% CI=8.8–24.3), followed by the upper extremity (22.7%; 4.9 injuries per 1000 hours; 95% CI=2.0-11.7) and spine/ribs/head (9.1%; 2.0 injuries per 1000 hours; 95% CI=0.5-7.8). In particular, lower extremity injuries were prevalent in the early (22.0 injuries per 1000 hours; 95% CI=9.2–53.0) and mid-to-late season (20.3 injuries per 1000 hours; 95% CI=9.7–42.6) (Table 3.6).

The hamstring (27.3%) was the most commonly injured location followed by the ankle (18.2%) and the hand and fingers (18.2%) (Figure 3.2). Injuries predominantly occurred to the dominant limb (63.7%) for both upper and lower extremity injuries (Figure 3.3). Injuries to muscle and ligament accounted for 40.9% (8.8 injuries per 1000 hours; 95% CI=4.6-16.9) and 36.4% (7.8 injuries per 1000 hours; 95% CI=3.9-15.6) of all injuries respectively (Table 3.7). Bone (13.6%) and tendon (9.1%) injuries were less common. Sprains (36.4%; 7.8 injuries per 1000 hours; 95% CI=3.9–15.6) and strains (31.8%; 6.8 injuries per 1000 hours; 95% CI=3.3–14.3) were the most commonly reported specific nature of injury. Contusions (13.6%), tendinopathies (9.1%), muscle tightness (4.5%) and growth-related issues (4.5%) were also recorded. Figure 3.4 provides a visual representation of the distribution of the different nature of injuries in each injured body part.

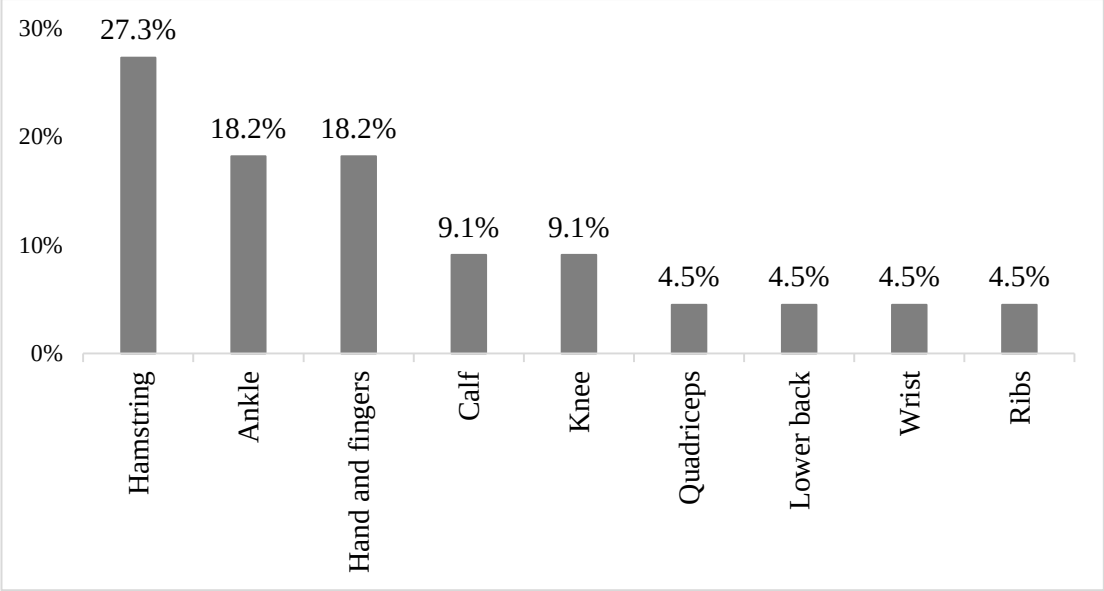

Figure 3.2 Location of reported injuries

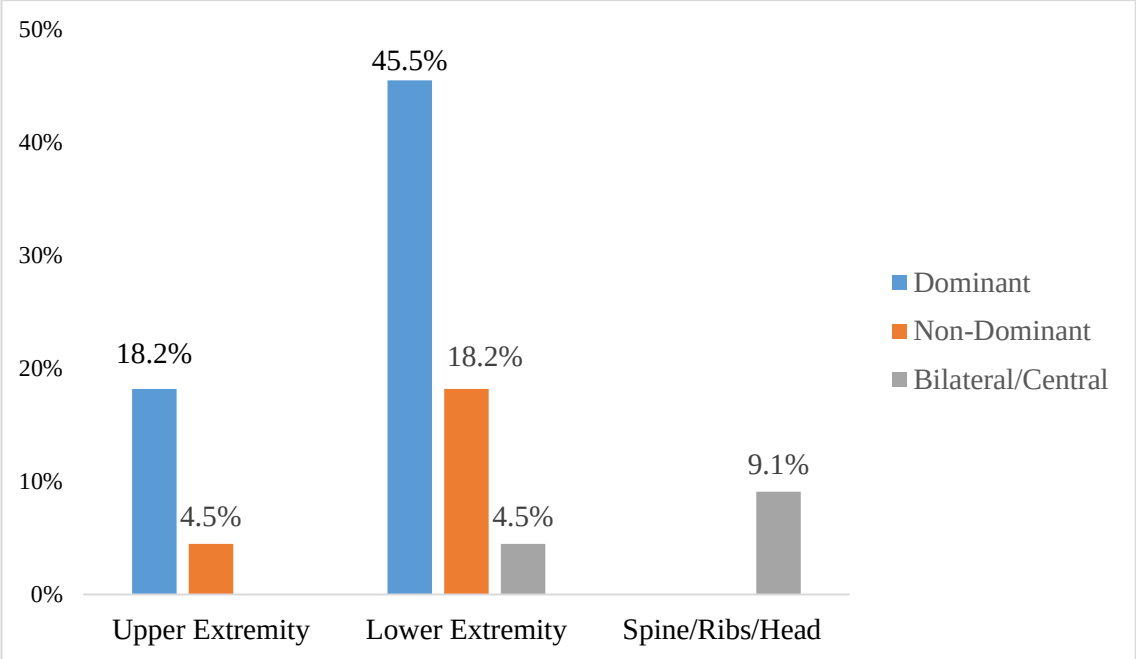

Figure 3.3 Side of injury

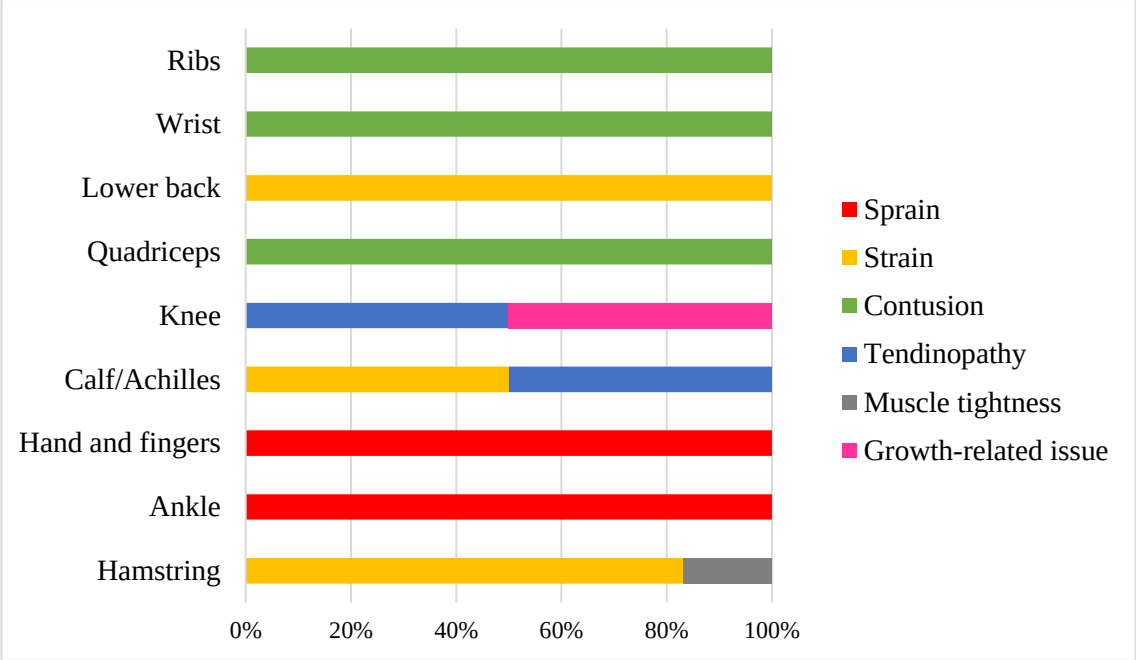

Figure 3.4 Nature of injuries sustained

Table 3.6 Classification of season injuries according to mean injury incidence per 1000 Gaelic football participation hours

Season Phase	Early (227h)		Mid (204h)		Mid-to-Late (345h)		Late (250h)		Overall (1026h)	
	Training= 162h Match= 65h		Training= 158h Match= 45h		Training= 212h Match= 133h		Training= 179h Match= 71h		Training= 711h Match= 315h	
	N (%)	**Injury Incidence (95% CI)**	**N (%)**	**Injury Incidence (95% CI)**	**N (%)**	**Injury Incidence (95% CI)**	**N (%)**	**Injury Incidence (95% CI)**	**N (%)**	**Injury Incidence (95% CI)**
	5 (22.7)	22.0 (9.2-52.9)	3 (13.6)	14.7 (4.7-45.6)	10 (45.5)	29.0 (15.6-53.9)	4 (18.2)	16.0 (6.0-42.6)	22 (100)	21.4 (14.1-32.6)
Injury Site										
Lower limb	**5 (100)**	**22.0 (9.2-52.9)**	**0**	**0.0**	**7 (70)**	**20.3 (9.7-42.6)**	**3 (75)**	**12.0 (3.9-37.2)**	**15 (68)**	**14.6 (8.8-24.3)**
Hamstring	2 (40)	8.8 (2.2-35.2)	0	0.0	3 (30)	8.7 (2.8-27.0)	1 (25)	4.0 (0.6-28.4)	6 (40)	5.9 (2.6-13.0)
Ankle	1 (20)	4.4 (0.6-31.3)	0	0.0	2 (20)	5.8 (1.5-23.2)	1 (25)	4.0 (0.6-28.4)	4 (27)	3.9 (1.5-10.4)
Calf	1 (20)	4.4 (0.6-31.3)	0	0.0	1 (10)	2.9 (0.4-20.6)	0	0.0	2 (13)	2.0 (0.5-7.8)
Knee	1 (20)	4.4 (0.6-31.3)	0	0.0	1 (10)	2.9 (0.4-20.6)	0	0.0	2 (13)	2.0 (0.5-7.8)
Quadriceps	0	0.0	0	0.0	0	0.0	1 (25)	4.0 (0.6-28.4)	1 (7)	1.0 (0.1-6.9)

Upper limb	**0**	**0.0**	**3 (100)**	**14.7 (4.7-45.6)**	**2 (20)**	**5.8 (1.5-23.2)**	**0**	**0.0**	**5 (23)**	**4.9 (2.0-11.7)**
Hand and fingers	0	0.0	2 (67)	9.8 (2.5-39.2)	2 (20)	5.8 (1.5-23.2)	0	0.0	4 (80)	3.9 (1.5-10.4)
Wrist	0	0.0	1 (33)	4.9 (0.7-34.8)	0	0.0	0	0.0	1 (20)	1.0 (0.1-6.9)
Trunk/Central	**0**	**0.0**	**0**	**0.0**	**1 (10)**	**2.9 (0.4-20.6)**	**1 (25)**	**2.9 (0.4-20.6)**	**2 (9)**	**2.0 (0.5-7.8)**
Lower back	0	0.0	0	0.0	0	0.0	1 (25)	4.0 (0.6-28.4)	1 (50)	1.0 (0.1-6.9)
Ribs	0	0.0	0	0.0	1 (10)	2.9 (0.4-20.6)	0	0.0	1 (50)	1.0 (0.1-6.9)

Note: N=number of injuries; h=hours; 95% CI=95% confidence intervals

Table 3.7 **Classification of injury nature, tissue injured and activity according to mean injury incidence per 1000 Gaelic football participation hours**

Season Phase	Early (227h)		Mid (204h)		Mid-to-Late (345h)		Late (250h)		Overall (1026h)	
	Training= 162h Match= 65h		Training= 158h Match= 45h		Training= 212h Match= 133h		Training= 179h Match= 71h		Training= 711h Match= 315h	
	N (%)	**Injury Incidence (95% CI)**	**N (%)**	**Injury Incidence (95% CI)**	**N (%)**	**Injury Incidence (95% CI)**	**N (%)**	**Injury Incidence (95% CI)**	**N (%)**	**Injury Incidence (95% CI)**
Injury Nature										
Sprain	1 (20)	4.4 (0.6-31.3)	2 (67)	9.8 (2.5-39.2)	4 (40)	11.6 (4.4-30.9)	1 (25)	4.0 (0.6-28.4)	8 (36)	7.8 (3.9-15.6)
Strain	2 (40)	8.8 (2.2-35.2)	0	0.0	3 (30)	8.7 (2.8-27.0)	2 (50)	8.0 (2.0-32.0)	7 (32)	6.8 (3.3-14.3)
Contusion	0	0.0	1 (33)	4.9 (0.7-34.8)	1 (10)	2.9 (0.4-20.6)	1 (25)	4.0 (0.6-28.4)	3 (14)	2.9 (0.9-9.1)
Tendinopathy	1 (20)	4.4 (0.6-31.3)	0	0.0	1 (10)	2.9 (0.4-20.6)	0	0.0	2 (9)	2.0 (0.5-7.8)
Muscle tightness	1 (20)	4.4 (0.6-31.3)	0	0.0	0	0.0	0	0.0	1 (5)	1.0 (0.1-6.9)
Growth-related	0	0.0	0	0.0	1 (10)	2.9 (0.4-20.6)	0	0.0	1 (5)	1.0 (0.1-6.9)

Tissue Injured										
Muscle	3 (60)	13.2 (4.3-41.0)	0	0.0	3 (30)	8.7 (2.8-27.0)	3 (75)	12.0 (3.9-37.2)	9 (41)	8.8 (4.6-16.9)
Ligament	1 (20)	4.4 (0.6-31.3)	2 (67)	9.8 (2.5-39.2)	4 (40)	11.6 (4.4-30.9)	1 (25)	4.0 (0.6-28.4)	8 (36)	7.8 (3.9-15.6)
Bone	0	0.0	1 (33)	4.9 (0.7-34.8)	2 (20)	5.8 (1.5-23.2)	0	0.0	3 (14)	2.9 (1.0-9.1)
Tendon	1 (20)	4.4 (0.6-31.3)	0	0.0	1 (10)	2.9 (0.4-20.6)	0	0.0	2 (9)	2.0 (0.5-7.8)
Activity										
Training	1 (20)	6.2 (0.9-43.8)	1 (33)	6.3 (0.9-44.9)	2 (20)	9.4 (2.4-37.7)	2 (50)	11.2 (2.8-44.7)	6 (27)	8.4 (3.8-18.8)
Match play	4 (80)	61.5 (23.1-164.0)	2 (67)	44.4 (11.1-177.7)	6 (60)	45.1 (20.3-100.4)	2 (50)	28.2 (7.1-112.6)	14 (64)	44.4 (26.3-75.0)
Gradual onset	0	0.0	0	0.0	2 (20)	*	0	0.0	2 (9)	*

Note: *exposure time for gradual onset injuries cannot be measured; N=number of injuries; h=hours; 95% CI=95% confidence intervals

3.4.3.2. Severity of Injury

Injuries recorded were predominantly minor (81.8%), with an equal amount of moderate and severe injuries (9.1%). The mean days lost from sport, recreational activity and physical education was 18.0±6.4 days (range: 12-24 days). Participants reported greater pain on the VAS scale at the time of injury (5.8±1.3; range: 3-8) compared to the time of injury assessment (1.9±2.0; range: 0-7).

3.4.3.3. Mechanism of Injury

Non-contact injuries (59.1%) were more common than contact injuries (40.9%). Sprinting (27.3%) was the most common mechanism of injury. Contact with another player (13.6%), contact with the ball (13.6%), overuse (13.6%) and tackling/being tackled (13.6%) were also common mechanisms of injury (Figure 3.5). Figure 3.6 provides a visual representation of the mechanism of injury for each injured body part.

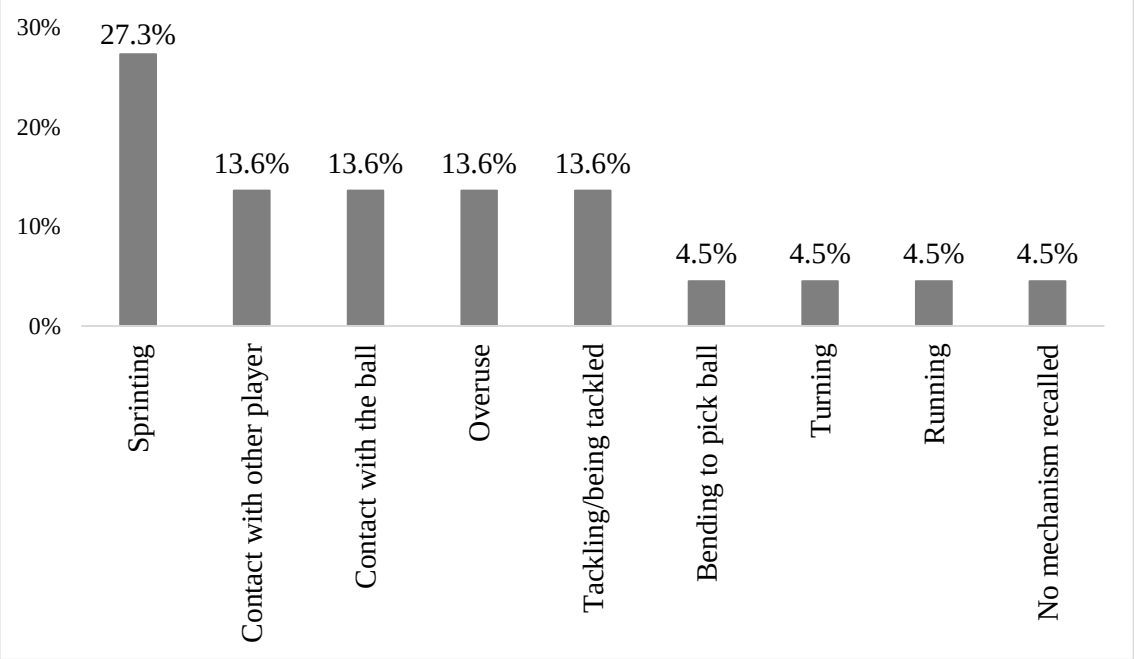

Figure 3.5 Mechanism of injury

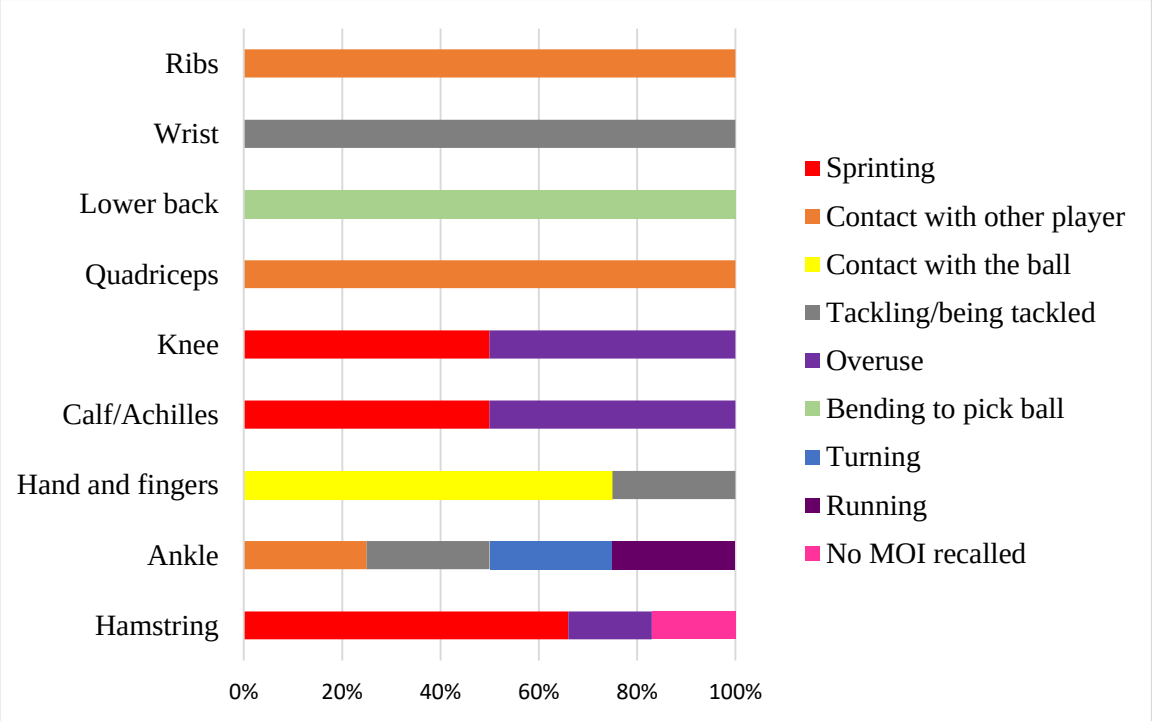

Figure 3.6 Mechanism and location of injuries sustained

3.4.3.4. Time of Injury

Injuries that occurred during matches were predominantly recorded during the second half (64.3%) compared to the first half (35.7%) (Figure 3.7). For training injuries, participants sustained the greatest amount of injuries from 46 to 60 minutes (50.0%), in the warm-up (33.3%) and from minutes 16 to 30 (16.7%).

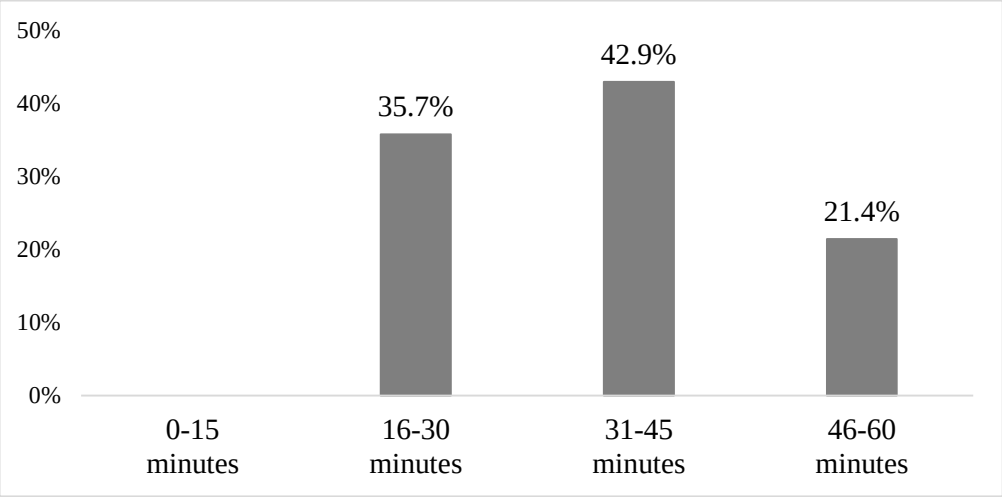

Figure 3.7 Timing of match injuries

3.4.4. Factors Surrounding the Injury

3.4.4.1. Relationship between volume of sports played and injury

Of the participants that sustained an injury, 85.0% participated in more than one sport or activity (range: 2-6). Soccer (60.0%) and rugby (25.0%), similar field-based team sports to Gaelic football, were the most popular other sports played by injured participants (Table 3.8).

Table 3.8 Sports played by injured participants outside of Gaelic football

Sport played	N	%
Soccer	12	60
Rugby	5	25
Hurling	3	15
Swimming	3	15
Basketball	2	10
Golf	2	10
Hockey	2	10
Athletics	1	5
Sailing	1	5
Gym	1	5
Badminton	1	5
Horse-riding	1	5

3.5 Discussion

This study aimed to prospectively examine the incidence and characteristics of musculoskeletal injuries sustained by male adolescent Gaelic footballers over one season. There is a current dearth of research examining the epidemiology of injury in male adolescent Gaelic footballers, with only two studies published to date (O'Connor et al., 2016a; Watson, 1996).

3.5.1. Baseline Testing

3.5.1.1. Sports Played

The majority of participants took part in multiple sports, with field-based team sports, including soccer and rugby, most commonly participated in outside of Gaelic football. Gaelic football, soccer and rugby have previously been reported as the most popular sports played by male adolescents (Murphy et al., 2017; O'Connor et al., 2016c). Enjoyment and to make friends and socialise are among the reasons cited by adolescents

for uptake of a sport (Murphy et al., 2017) and team sports like Gaelic football, soccer and rugby provide these opportunities for adolescents. In addition, participation in multiple sports allows diverse sports participation for adolescents and avoids the negative effects of early sports specialisation. Sports specialisation, defined as intense year-round training in a single sport at the exclusion of other sports (Jayanthi et al., 2013), is associated with overuse injuries, burnout and dropout in young athletes (Myer et al., 2015). However, a lack of sports specialisation and participation in multiple sports can result in greater exposure with more frequent training sessions and competitions and an overall greater risk of injury (Kaleth and Mikesky, 2010). This finding is highlighted by the fact that 85.0% of injuries recorded during the season were experienced by Gaelic footballers who participated in another sport. Therefore, it is clear that optimal participation levels lie intermediately between sports specialisation and participation in multiple sports, with open communication between players, parents, coaches and sports medicine clinicians fundamental to striking the correct balance.

3.5.1.2. Injury History

Over half of all participants sustained an injury in the previous 12 months, with more than one-fifth reporting two injuries or more. This rate of injury is higher than that reported by O'Connor et al. (2016c) in male secondary school adolescents prospectively over one academic year (35.6%). The current study included the summer months of July and August, where sports and physical activity participation hours may be high and exposure to injury risk elevated, which may explain the higher incidence of injury. Strains, sprains and fractures were most common and injuries frequently occurred to the hamstring and ankle, with similar injury trends reported previously in Irish secondary school students (O'Connor et al., 2016c). Injuries sustained in adolescence can detrimentally impact long-term participation in sport, with serious injury as a youth participant shown to cause premature dropout from sport participation (Murphy et al., 2017) and previous injury regarded as an important non-modifiable injury risk factor (Meeuwisse et al., 2007). Therefore, understanding injury history can be important when considering injury prevention strategies.

3.5.2. Gaelic Football Injury Incidence

One-fifth of participants sustained an injury during the season, with 4.8% sustaining a repeat or subsequent injury, which was lower than the proportion of injuries (32.5%) and repeat injuries (26.3%) previously reported in older adolescent players (O'Connor et al.,

2016a). Hurlers were also included in the study of adolescent Gaelic players by O'Connor et al. (2016a), making it difficult to interpret and compare the specific injury risk associated with Gaelic football. However, age and the likelihood of previous injury in older players may explain the substantial difference in incidence and repeat incidence proportion between the current adolescent participants (13.4±1.1 years) and previously examined older adolescent Gaelic footballers (15.7±0.8 years) (O'Connor et al., 2016a). Previous injury is a predominant risk factor for re-injury, as athletes may return to sport following injury with deficits in strength, range of motion or proprioception (Maffey and Emery, 2006). In addition, the retrospective examination of injuries conducted in the current study indicated almost 30.0% of adolescent Gaelic footballers do not seek treatment when injured, highlighting players may not complete adequate rehabilitation and may return from injury with physical deficits. Therefore, older adolescents and adult Gaelic footballers may have increased injury risk.

Interestingly, greater injury incidence was identified in the current study (21.4 injuries per 1000 hours) compared to that reported previously in male adolescent (4.9 injuries per 1000 hours) (O'Connor et al., 2016a) and collegiate Gaelic footballers (12.6 injuries per 1000 hours) (O'Connor et al., 2017), despite all studies having equivalent injury definitions. The differences may be attributed to the longer season duration reported in previous studies (O'Connor et al., 2017; O'Connor et al., 2016a). In addition, the number of current participants is lower than in previous adolescent (N=292) (O'Connor et al., 2016a) and collegiate research (N=217) (O'Connor et al., 2017). Therefore, injuries recorded in a smaller sample size over a shorter study duration could potentially explain the high incidence rate observed.

Injuries sustained during match play were statistically greater than training injuries, despite training hours being over two times greater than match hours. These findings are similar to previous research (O'Connor et al., 2017; O'Connor et al., 2016a; Watson, 1996) and indicate the greater incidence of match injuries may be attributed to the greater intensity and physicality, increased levels of physical contact and competitiveness indicative to match play (Murphy et al., 2012; Wilson et al., 2007). In addition, mid-to-late season injuries were most common in male adolescents, with late in-season injuries prevalent in previous research in elite adult Gaelic footballers (Malone et al., 2017d). Direct comparison between injury phases is not possible as Malone et al. (2017d) divided

the in-season into early and late phases. However, the results indicate injuries are more prevalent towards the latter stages of the season, where games are knock-out and coaches are increasing the focus on technical and tactical skills to prepare players (Malone et al., 2017d).

3.5.3. Injury Description

3.5.3.1. Type, Nature and Location of Injury

Injuries predominantly had an acute onset, similar to previous research in adolescent (73.3%) (O'Connor et al., 2016a) and collegiate Gaelic footballers (78.9%) (O'Connor et al., 2017). The majority of injuries were also new occurrences, with less than one tenth a reoccurrence of a previous injury. A higher recurrent injury rate has been noted previously in older adolescent (52.7%) (O'Connor et al., 2016a) and collegiate Gaelic footballers (23.4%) (O'Connor et al., 2017), which may be attributed to the finding that almost 70.0% of Gaelic footballers play through injury (O'Connor et al., 2016a). Over 80.0% of current participants continued to play when injured, suggesting young players may not be completing adequate rehabilitation, which may lead to an increased risk of recurrent injury in the future. The lack of medical professionals available to youth players within the GAA may highlight the root of the problem. The additional provision of healthcare professionals (i.e., athletic therapists or physiotherapists) or the education of coaches in the referral of injuries must become a priority to manage the incidence of injury in Gaelic football.

Injuries to the lower extremity were common, in particular, in the hamstring and ankle. The occurrence of hamstring and ankle injuries was higher in the current study compared to hamstring (13.3% to 15.5%) and ankle injuries (11.3% to 12.0%) previously reported in older adolescent (O'Connor et al., 2016a) and collegiate male Gaelic footballers (O'Connor et al., 2017). The variance may be attributed to developmental differences in younger adolescents and the myo-osseous disproportion between the growth of bone and connective soft tissue (Patel and Nelson, 2000). Injuries to muscle and ligament were also frequent and in particular, sprains and strains were common. Previous research also identified the prevalence of sprains and strains in male adolescent (22.7% and 30.7% respectively) (O'Connor et al., 2016a) and collegiate Gaelic footballers (27.5% and 53.5% respectively) (O'Connor et al., 2017), while muscle (53.5%) and ligament (27.5%) injuries were also common in collegiate players (O'Connor et al., 2017). Sprinting,

change of direction, jumping, catching, landing, kicking, passing and scoring, along with high levels of physical contact, are key elements of Gaelic football (O'Connor et al., 2016a; Murphy et al., 2012;). Each of these components combined with the high-intensity, high-velocity nature of the game (Murphy et al., 2012) may explain the frequent occurrence of muscle and ligament injuries in the lower extremity and in the hamstring and ankle. Injury prevention strategies must be implemented that aim to reduce the occurrence of these injuries, which may reduce the risk of injury, allowing for increased team success and overall uptake of the sport, while minimising dropout due to injury.

Hand and finger injuries were also commonly observed and were higher than previously reported in older adolescent (10.7%) (O'Connor et al., 2016a) and collegiate players (9.2%) (O'Connor et al., 2017). Specifically, the majority of hand and finger injuries occurred as a result of contact with the football, with one quarter associated with tackling. Gaelic football is a ball-oriented sport, where the ball is moving at high speeds during play and thus, hand and finger injuries may be expected. Younger adolescents are still mastering the inherent skills of the game and may have lower motor and spatial awareness skill levels (Romiti et al., 2008), compared to older adolescent or collegiate players, particularly in phases of play that involve tackling and catching. Lack of hand and finger strength in younger adolescents may also be an important consideration, as grip strength increases through adolescence, with the greatest increase in handgrip strength evident between 13 and 15 years (Visnapuu and Jurimae, 2007). In addition, the size of the football may contribute to hand and finger injuries. At under-15 and under-16 levels, a size 5 football is introduced which is bigger and heavier than the size 4 football used up to under-14 level. The change in football size at a stage when handgrip strength may not be sufficiently developed could explain the high incidence of hand and finger injuries observed. Delay of the change in football size combined with an increase in technical drills that encourage proficient catching and tackling may reduce the incidence of hand and finger injuries.

Knee injuries accounted for 9.1% of all injuries recorded over the season. This finding conflicts with previous research that identified the knee as one of the top three most common locations of injury in older adolescent (O'Connor et al., 2016a), collegiate (O'Connor et al., 2017) and adult cohorts (Murphy et al., 2012; Crowley et al., 2011; Newell et al., 2006; Cromwell et al., 2000). The differences identified in knee injuries

between the present study and previous available research may be attributed to the assumed higher impact forces associated with increased physical development and skill and the greater speed and intensity of game play with greater age and levels of play (Romiti et al., 2008).

The majority of injuries were recorded in the dominant limb, with nearly half of lower extremity injuries occurring in the dominant kicking leg. Research to date has failed to comprehensively report the effect of limb dominance on injury rates in Gaelic football, with only one study in elite players identifying the prevalence of lower extremity dominant limb injuries (43.0%) (Cromwell et al., 2000). Research shows male athletes are significantly more likely to injure their dominant leg (Niu et al., 2011; Brophy et al., 2010). Side-to-side imbalances between muscular strength and recruitment patterns can occur when one limb is dominant, with one side demonstrating greater dynamic control, which may consequently cause imbalances in neuromuscular strength, flexibility and co-ordination and increase injury risk (Ford et al., 2003). Therefore, coaching should aim to reduce the focus on a dominant limb and promote bilateral skill execution, which also may be advantageous for performance.

3.5.3.2. Severity of Injury

Injuries reported during the season were predominantly minor, with less than one fifth of injuries regarded as moderate or severe. Previous research identified minor, moderate and severe injuries were relatively equivalent in male adolescent (41.7%, 20.8% and 37.5% respectively) (O'Connor et al., 2016a) and collegiate Gaelic footballers (34.8%, 29.8% and 35.5% respectively) (O'Connor et al., 2017). Mean time-loss from sport was 18.0±6.4 days, which is lower than previously reported in male adolescent Gaelic footballers (34.0±37.1 days) (Watson, 1996). The reduced severity of injury noted in the current study may be attributed to the prevalence of hand and finger injuries that require fewer days absent from Gaelic football participation (26.8 days absent per 1000 hours) (O'Connor et al., 2017). In contrast, knee (80.8 days absent per 1000 hours), ankle (52.8 days absent per 1000 hours) and hamstring (38.6 days absent per 1000 hours) injuries have a greater associated injury burden (O'Connor et al., 2017).

3.5.3.3. Mechanism of Injury

Non-contact injuries were prevalent, similar to previous research in male adolescent (64.0%) (O'Connor et al., 2016a) and collegiate Gaelic footballers (52.1%) (O'Connor et

al., 2017). Sprinting was the most common specific mechanism of injury, as also identified previously in adolescent (25.7%) (O'Connor et al., 2016a) and collegiate players (24.8%) (O'Connor et al., 2017). Sprinting is a common mechanism of injury for the hamstring (Yu et al., 2017), as the muscles are eccentrically working to decelerate knee extension towards the end of the swing phase, while rapidly changing to concentrically extend the hip joint (Petersen and Holmich, 2005). Injury prevention measures aimed at strengthening the muscle in this potentially vulnerable position may be beneficial. An eccentric hamstring-strengthening programme was shown to reduce the occurrence of hamstring injuries in soccer players by 65.0% (Arnason et al., 2008) and should be considered in Gaelic football.

Contact with the ball or another player and overuse were also frequent mechanisms of injury. In addition, tackling/being tackled was a common injury mechanism, similar to adolescent (14.9%) (O'Connor et al., 2016a) and collegiate Gaelic footballers (20.6%) (O'Connor et al., 2017). Gaelic football is a contact, ball-oriented sport where tackling and high-speed ball contact are indicative of the game (Murphy et al., 2012; Wilson et al., 2007). Therefore, it may be difficult to eliminate these common injury mechanisms as the introduction of new rules that attempt to eliminate or manage tackling or contact with the ball may be met with resistance from stakeholders due to their potential ability to negatively impact the nature of the game. Therefore, the real-world effectiveness of injury prevention measures, in terms of implementation and intervention uptake, must be considered (Finch, 2006).

3.5.3.4. Time of Injury

The majority of injuries occur towards the latter stage of training and matches and previous research has shown comparable results, with injuries predominantly occurring in the second half for male adolescent (56.0%) (O'Connor et al., 2016a) and collegiate Gaelic footballers (71.3%) (O'Connor et al., 2017). The frequency of late training and second-half match injuries may be a result of fatigue, leading to decreased muscle activity and force production, altered proprioception, reduced cognitive function and slower reaction times (Abd-Elfattah et al., 2015; Newell et al., 2006). Fatigue has also been demonstrated to alter hip and knee kinematics during the crossover cut manoeuvre in Gaelic footballers (Whyte et al. 2018). The consideration of rule changes regarding substitute players may help in reducing the incidence of fatigue-related injuries.

Currently, the rules state that six substitute players may be introduced to replace a teammate but by increasing this number or introducing rolling substitutes, the effect of fatigue and the incidence of late training and match injuries may be reduced. Foul play or increased risk-taking behaviours can also become more prevalent in the second half of a game, as Gaelic footballers may become more competitive and aggressive when their team is losing. Referees and coaches must play an important role in deterring dangerous behaviours. In addition, with the prevalence of injuries occurring directly after the half-time break period (between the 31st to 45th minute of match play), consideration of a brief re-warm-up strategy during half-time may be appropriate. Active re-warm-up has been shown to effectively improve performance in similar field-based team sports (Lovell et al., 2013a; Lovell et al., 2013b) and has been suggested as an important factor for attenuating the reduction in high-speed and sprint distance covered during Gaelic football matches (Malone et al., 2016).

3.6 Limitations

Data collection was conducted in urban and rural Gaelic football settings in Westmeath, indicating the findings may not be generalisable to other populations in different geographic or socioeconomic settings. In addition, injury history was only determined for injuries sustained by participants in the previous 12 months. However, previous injury is a risk factor for re-injury (Maffey and Emery, 2006) and injuries that occurred greater than 12 months previously may still act as a risk factor for re-injury. The injury history questionnaire also failed to record the sport where injuries were sustained so retrospective analysis of Gaelic football injuries was not possible. A substantially low number of time-loss injuries were recorded, which may be due to a short season of data collection. Future research should examine injuries prospectively over a full year in a larger cohort.

3.7 Conclusion

Musculoskeletal injures are common in male adolescent Gaelic footballers, with one fifth of players experiencing an injury during the season. Acute, lower extremity injuries to muscle and ligament were most frequent. Non-contact injuries to the dominant limb were common, particularly in the hamstring, ankle, hand and fingers. Injuries were predominantly of minor severity and sprinting was the most common mechanism of injury followed by contact with the ball, contact with another player, overuse and

tackling/being tackled. Match and training injuries were most common in the later stages of play. The findings highlight the need for comprehensive musculoskeletal injury prevention programmes for male adolescent Gaelic footballers. Effective injury prevention may reduce the risk of injury as players' progress to adult Gaelic football and may also minimise player dropout, improve team success and promote life-long sport participation among male adolescent Gaelic footballers.

3.8 Summary

The prevalence of musculoskeletal injury in male adolescent Gaelic footballers highlights the need for appropriate injury prevention programmes. The epidemiology of injury highlighted in the current chapter identifies the essential factors that need to be considered when designing preventative programmes to reduce the incidence of injury. A reduction in the occurrence of injury may also be facilitated through effective monitoring of applied loads in adolescents. To elicit physiological adaptations beneficial for optimal performance, an adequate training stimulus needs to be applied (Comyns and Flanagan, 2013). However, the application of excessive training and match loads can increase players' susceptibility to injury (Bourdon et al., 2017) and thus, may increase the incidence of injury in Gaelic football. There is currently no available research examining the relationship between load and injury in adolescent Gaelic footballers. Therefore, Chapter 4 aims to address the gap in the literature by examining the association between load and injury in male adolescent Gaelic footballers.

Chapter 4. The Association Between Internal Load and Musculoskeletal Injury in Male Adolescent Gaelic Footballers

Publications from this chapter:

O'Keeffe, S., O'Connor, S., Ní Chéilleachair, N. (2020). Are Internal Training Load Measures Associated with Injuries in Male Adolescent Gaelic Football Players? *European Journal of Sport Science.* 20(2), pp.249-260. DOI: 10.1080/17461391.2019.1621950

4.1 Abstract

Background: The volume and intensity of loads applied to adolescent Gaelic footballers must be appropriate in order to elicit physiological adaptations beneficial to performance, while also allowing for adequate recovery to minimise the risk of injury. Monitoring load allows coaches and clinicians to assess if a player is optimally responding to their applied load. However, there is a current dearth of research examining the association between load and injury in male adolescent Gaelic footballers.

Aim: To examine internal load and its association with musculoskeletal injury in male adolescent Gaelic footballers.

Methods: Written training diaries were completed by 97 male adolescent Gaelic footballers weekly and injuries, defined as any injury sustained during training or competition causing restricted performance or time loss from play, were assessed by a Certified Athletic Therapist. Daily load was determined for each player (session rating of perceived exertion by session duration) and summed to give weekly load. Univariate and multiple logistic regressions were conducted to determine the association with injury.

Results: Periodic variations in weekly load and injuries were evident throughout the season. Univariate analysis identified weekly load (OR=2.75; 95% CI=1.0–7.6), monotony (OR=4.17; 95%CI=1.5–11.7) and absolute change in load (OR=3.27; 95% CI=1.2–9.3) greater than the team average were significant injury risk factors. Multiple logistic regression, with 2-weekly and 3-weekly cumulative loads, absolute change, monotony, strain, acute: chronic workload ratio (ACWR) and age as independent variables, identified internal load measures (monotony, strain and absolute change) were associated with injury with high specificity (96.0%) but low sensitivity (25.0%).

Conclusion: The findings highlight the need to monitor team and individual loads to avoid sudden week-to-week changes or excessive weekly loads. Open communication between players, parents, coaches and sports medicine clinicians enables effective load monitoring that can reduce injury risk and may subsequently minimise dropout, improve team success and overall sport enjoyment and promote life-long sports participation.

4.2 Introduction

Gaelic football is one of the most popular spectator and participatory sports in Ireland (Reilly et al., 2015) and is regarded as the most popular club sport played by male adolescents (Murphy et al., 2017). Gaelic football requires repeated, short-duration, high-intensity anaerobic exercise combined with light-to-moderate aerobic activity (Cullen et al., 2013), while incorporating skilful hand and foot passing (Malone et al., 2017d). The primary aim of the game is to outscore the opposition by winning possession of the ball, evading opponents and breaking tackles (Cullen et al., 2013). To prepare a player for the physical demands of Gaelic football, coaching staff must efficiently control, alter and monitor loads (Henderson et al., 2015) to assess if an athlete is optimally adapting to their applied load, while also minimising injury (Malone et al., 2017d).

Load can be measured via internal (physiological and psychological stress imposed by applied load) and external measures (work done independent of the athlete's internal characteristics) (Halson, 2014). Recent technological advances have allowed the development of wearable internal and external load monitoring tools such as heart-rate monitors, GPS, time-motion analysis and accelerometers (Haddad et al., 2017). However, despite their ability to track precise player data in training and match environments and offer extensive information on the training stimulus (Comyns and Flanagan, 2013; Haddad et al., 2017), there are associated limitations. The considerable expense, time-consuming data analysis, requirement for high technical proficiency and danger of losing data due to technical error (Comyns and Flanagan, 2013; Haddad et al., 2017) limits their practicality in amateur and community sport environments. Alternatively, an easily administered, non-invasive, feasible and well-accepted method for monitoring load is sRPE (Comyns and Flanagan, 2013; Foster et al., 2001). The cost-effectiveness, simplicity and within-player validity of sRPE (Malone et al., 2020; Malone et al., 2017d), along with its ability to quantify load regardless of mode or location (Bourdon et al., 2017), highlights its use in amateur sport environments. sRPE is a subjective load monitoring measure deemed more sensitive and consistent than objective measures in assessing acute and chronic changes in an athlete's response to imposed loads (Saw et al., 2015). sRPE has been shown as a valid measure of quantifying load in rugby (Gabbett and Domrow, 2007) and Australian Rules football (Scott et al., 2013), sports which possess similar characteristics to Gaelic football.

Monitoring load in adolescents is important as rapid physical, physiological and psychological pubertal changes occur during adolescence (Gabbett et al., 2014), which may affect the load response. Young athletes' volume of training is continually increasing (Gould and Whitley, 2009) and in particular, with diverse sports participation, adolescents participate in frequent training and competitions (Kaleth and Mikesky, 2010), leading to high exposure and sports participation rates. Year-long training patterns, a congested calendar with overlap of match fixtures between sports and the prevalence of Gaelic players playing with sub-elite (club and school) and elite (county) teams and varying age levels simultaneously increases load, can result in poor recovery between matches and trainings (Malone et al., 2017c) and may increase adolescents' susceptibility to injury (Brenner, 2007). Research to date has monitored load in elite adult Gaelic footballers, with a clear association between higher loads and increased injury risk evident (Malone et al., 2017d). Similarly, ACWR, which describes the acute load (from previous week) in relation to the chronic load (average of previous four weeks) (Blanch and Gabbett, 2016), has been utilised to explain load changes and the association with injury in elite Gaelic footballers. The greatest injury risk is suggested to exist when the ACWR exceeds 2.0, whereas, moderate to high ACWR of ≥1.35 to ≤1.50 protects against injury in the preseason and early in-season but not late in-season (Malone et al., 2017d). Research in Gaelic football has focused on elite adult players. However, findings in adult players may not be applicable to adolescents due to the varying physiological traits and responses to load evident, attributed to maturation (Gabbett et al., 2014).

Research in adolescent Gaelic footballers to date has explored external match and training loads with the focus on examining aerobic capacity using estimated VO_{2max} (Roe and Malone, 2016) and monitoring heart rate and distance covered via GPS technology (Reilly et al., 2015). While external load monitoring may be useful, internal load measures can provide information on how the individual responds to imposed loads without the need for specialised costly equipment (Haddad et al., 2017). Research in soccer using subjective exposure hours has shown injury incidence to quadruple in adolescents exposed to more than 3 hours of training but more than 5 hours of training may have a protective effect against injury (Schmikli et al., 2011). sRPE is an additional internal load monitoring tool that incorporates exposure hours with session intensity and can provide comprehensive data for coaches and sports medicine clinicians. Despite the continued growth and popularity of Gaelic football in youth participants (Murphy et al., 2017) and

increased pressure on players to be successful and perform to a high standard from parents/coaches (Hughes and Hassan, 2017), the appropriate internal load for adolescents that minimises the risk of injury is under-explored and poorly understood. In particular, the exploration of internal load as measured by sRPE and its relationship with injury has not been examined. Therefore, this study aimed to identify the association between internal load measures and injury in male adolescent Gaelic footballers.

4.3 Methodology

4.3.1. Participants

Ninety-seven male adolescents (13.4±1.1 years) that played under-14 (N=66) or under-16 (N=31) Gaelic football were conveniently recruited from three sub-elite Gaelic football teams in county Westmeath. The inclusion criteria required participants to be an adolescent male, Gaelic footballer and member of a recruited under-14 or under-16 sub-elite Gaelic football team. Parental/guardian written informed consent and participant assent (Appendix T) were granted prior to the study beginning following an information session, as detailed in Section 3.3.1. Ethical approval was granted by the AIT Research Ethics Committee (#20161125).

4.3.2. Testing Procedure

Data collection took place for one underage Gaelic football season. Gaelic football teams were tracked for 15.2±8.9 weeks, depending upon success, where teams that were more successful participated for a longer season. All injuries sustained during Gaelic football participation, defined as any injury sustained during training or competition resulting in restricted performance or time loss from play (O'Connor et al., 2016a), were assessed by a Certified Athletic Therapist. Injuries were recorded using a standardised injury report form (Appendix W), as detailed in Section 3.3.2.2.

A written self-recall diary (Appendix V), adapted from a validated training diary (O'Connor et al., 2016b), was utilised to record sport/physical activity training and matches, recreational activity and physical education completed in the previous week. The diary documented the activity, type of participation, level played at and duration and was completed weekly at one training session, which was agreed upon at the start of the study. Exposure for any player absent from weekly training sessions was not recorded for that week, which occurred in 9.3% of participants. A familiarisation session was held at

the beginning of the season to explain the diary in detail. In addition, the intensity of each session was determined using the modified RPE scale (Foster et al., 2001). Coaches were present to remind players of the sessions completed in the previous week but each player was instructed to report sRPE individually without consultation with teammates for accuracy and to eliminate the effect of peer-pressure or duplication of teammates' ratings (Malone et al., 2017b).

4.3.3. Statistical Analysis

Data were analysed using Microsoft Excel 2016 (Microsoft Corporation, Redmond, Washington, USA) and IBM SPSS (version 24: IBM, New York, USA). The Gaelic football season was divided into four phases; early (week 2–7), mid (week 8–14), mid-to-late (week 15–21) and late season (week 22– 28). sRPE values for week 1 were not collected due to communication issues with coaches during the initial week of data collection. Load data represents weekly participation in sports (not solely Gaelic football). Missing values were estimated by replacing the missing load values with the mean value of the corresponding week (Brink et al., 2010). Load, measured in AU, was determined for each player by multiplying the rating of session intensity by session duration (Foster et al., 1995) and daily loads were summed to give weekly load. In addition, cumulative two-, three and four-weekly loads, ACWR, absolute load changes from week-to-week, monotony (mean session load divided by standard deviation of load for that week) and strain (weekly load multiplied by monotony) (Foster, 1998) were calculated. Descriptive statistics for load measures and injuries were calculated for the season and each season phase for under-14 and under-16 players.

Due to the skewed nature of training and match load, physical education and recreational activity data, as is common with measures of athletic performance (Malone et al., 2017a), load measures were log-transformed by taking the natural logarithm (Ln). Independent samples T-tests determined differences in load, strain and monotony between under-14 and under-16 players. One-way repeated measures analysis of variance (ANOVA) with Bonferroni post-hoc analysis compared load across season phases and one-way between groups ANOVA with Tukey post-hoc test analysed differences in load by playing position. Effect sizes were calculated using eta or partial eta squared and determined according to Cohens' classification; small=0.01, moderate=0.06 and large=0.14 (Cohen, 1988). Initially, univariate logistic regression was performed to examine whether age and

internal load measures were injury risk factors, with ORs and 95% CI examined. Internal load measures were coded as ≤ or > season average. OR greater than one indicated increased injury risk. All variables that were significant at P≤0.20 (Van Middelkoop et al., 2008) were subsequently analysed in a backward likelihood ratio stepwise multiple logistic regression to identify their ability to predict injury. The sensitivity and specificity of the overall model were reported along with ORs and 95% CI. Multicollinearity in multiple logistic regression was assessed by examining variance inflation factors (VIFs), with a VIF>10 indicating multicollinearity. Multicollinearity was noted for weekly and 4-weekly cumulative loads. Significance of 0.05 was set for all statistical tests (P≤0.05).

4.4 Results

Periodic variations in internal loads were evident throughout the season with spikes in accumulated weekly load (1037–1798 AU) and absolute changes in load (65–1571 AU) evident (Figure 4.1). Strain was consistently greater than load throughout the early and mid-season phases but load became greater than strain in the mid-to-late and late season phases (Figure 4.1). The overall average weekly load for the season was 898±311 AU. Weekly loads were not significantly different between under-14s (771±594 AU) and under-16s (676±471 AU) (P=0.53; η^2=0.00). No significant differences were evident in monotony between under-14 (0.490±0.21) and under-16 players (0.43±0.18) (P=0.07; η^2=0.04). Similarly, strain was not significantly greater in under-14 (649±961 AU) compared to under-16 players (437±378 AU) (P=0.59; η^2=0.00). Load was greatest in the early (1219±390 AU) and mid-season (979±105 AU) compared to mid-to-late (617±104 AU) and late season (823±244 AU). A significant difference in load between phases was evident (P=0.01; η^2p=0.98), with early season loads significantly greater than mid-to-late season loads (P=0.01) and mid-season loads significantly greater than mid-to-late season loads (P=0.00). Loads were not significantly greater for backs (795±595 AU), forwards (726±568 AU), midfielders (553±280 AU) or goalkeepers (795±552 AU) (P=0.82; η^2= 0.01).

The greatest spike in injuries occurred during weeks 14–16 (Figure 4.1) with large variations in absolute change in load prior to this from weeks 8–12 (113–753 AU) (Figure 4.1). A spike in injuries was evident in the late phase of the season in weeks 24 and 26 following consistent increases in load from weeks 20–26 (512–1121 AU) (Figure 4.1).

Univariate analysis identified players with weekly loads greater than the average season load of 898 AU (OR=2.75; 95% CI=1.0–7.6; P=0.05), monotony greater than 0.53 (OR=4.17; 95% CI=1.5– 11.7; P=0.01) and absolute change in load greater than 410 AU (OR=3.27; 95% CI=1.2–9.3; P=0.03) were significantly more likely to sustain an injury (Table 4.1). As multicollinearity was detected for weekly and cumulative 4-weekly loads, they were not included in the multiple logistic regression. The final multiple logistic regression model, which included age (OR=1.46; 95% CI=0.9–2.4), monotony >0.53 (OR=6.16; 95% CI=1.6–24.1), strain >809 AU (OR=0.35; 95% CI=0.1–2.3) and absolute change in load >410 AU (OR=3.70; 95% CI=0.9–15.8), were significantly associated with injury (Table 4.1). The overall model explained 13.0–20.2% of the variance in injury with 25.0% sensitivity and 96.0% specificity ($\chi^2(4)=13.23$; P=0.01).

Table 4.1 Univariate and multiple logistic regression analyses identifying predictors of injury

Variable		OR (95% CI)	P value
Univariate			
Age[1]		1.3 (0.8-2.1)	0.25
1-weekly	≤ 898 AU (Reference)	1.0	-
	> 898 AU	2.8 (1.0-7.6)	0.05*
2-weekly	≤ 1713 AU (Reference)	1.0	-
	> 1713 AU	2.6 (0.9-7.1)	0.07
3-weekly	≤ 2376 AU (Reference)	1.0	-
	> 2376 AU	2.6 (0.9-7.1)	0.07
4-weekly	≤ 2996 AU (Reference)	1.0	-
	> 2996 AU	2.6 (0.9-7.1)	0.07
ACWR	≤ 1.30 (Reference)	1.0	-
	> 1.30	0.4 (0.1-1.2)	0.11
Monotony	≤ 0.53 (Reference)	1.0	-
	> 0.53	4.2 (1.5-11.7)	0.01*
Strain	≤ 809 AU (Reference)	1.0	-
	> 809 AU	2.5 (0.8-7.9)	0.12
Absolute Change	≤ 410 AU (Reference)	1.0	-
	> 410 AU	3.3 (1.2-9.3)	0.03*
Multiple logistic regression			
Age[1]		1.5 (0.9-2.4)	0.13
Monotony	≤ 0.53 (Reference)	1.0	-
	> 0.53	6.2 (1.6-24.1)	0.01*
Strain	≤ 809 AU (Reference)	1.0	-
	> 809 AU	0.4 (0.1-2.3)	0.28
Absolute Change	≤ 410 AU (Reference)	1.0	-
	> 410 AU	3.7 (0.9-15.8)	0.41

Note: *=significant; AU=arbitrary units; ACWR=acute: chronic workload ratio; OR=odds ratio; 95% CI=95% confidence interval; P=significance; [1]Age is a continuous variable

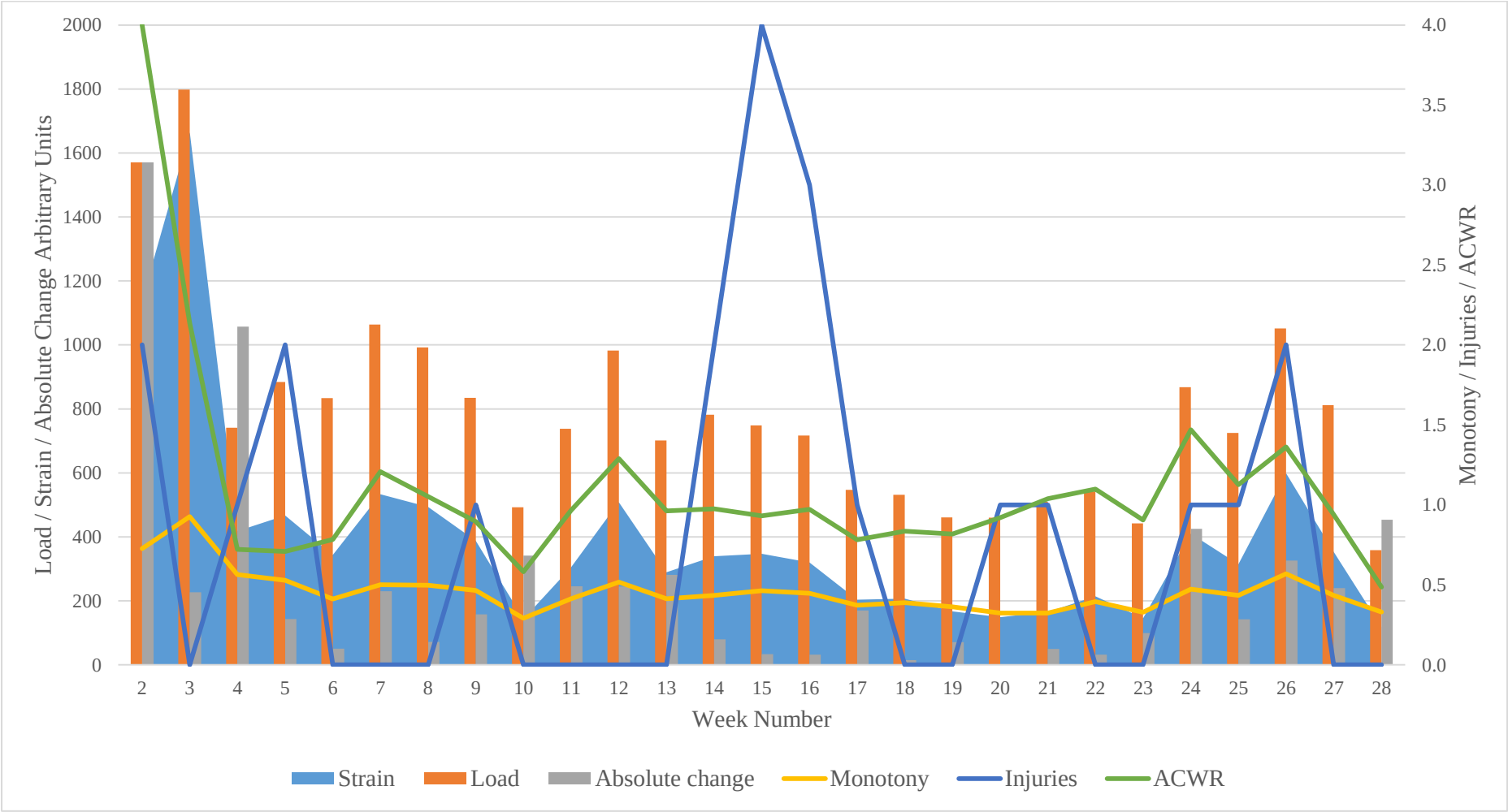

Figure 4.1 Load, absolute change, strain, monotony, ACWR and the frequency of injuries over the season

4.5 Discussion

Prescription of adequate workloads is necessary to tolerate load and elicit performance effects (Bourdon et al., 2017). Nonetheless, sudden increases or spikes in load are detrimental to athletes' performance (Malone et al., 2017d), as was evident in the significant association between high absolute week-to-week changes in load and injury. Similarly, this association indicates sudden decreases or undertraining may also have a detrimental effect on Gaelic footballers. High absolute changes in load have also been associated with increased injury risk in rugby (Cross et al., 2016) and Australian football (Rogalski et al., 2013) when using sRPE load measures. The U-shaped relationship between injury and load outlines that both undertraining and overtraining can increase the risk of injury (Bourdon et al., 2017). These findings support the theory that team-sport athletes are better able to sustain small increases or decreases in load rather than larger deviations (Soligard et al., 2016) and avoiding spikes greater than 10.0% may be successful (Murray, 2017). Therefore, periodic variations in internal load across the season is advised but appropriate monitoring measures must be in place to avoid the application of sudden changes that may increase players' vulnerability to sustaining an injury that can be detrimental to performance.

Male adolescent Gaelic footballers with high weekly cumulative loads had a threefold significantly increased risk of injury. Monotony was also significantly associated with injury, increasing the risk of sustaining an injury fourfold. In addition, the univariate analysis identified those with excessive 2-weekly, 3-weekly and 4-weekly loads have more than doubled their risk of sustaining an injury, however, the associations were not significant. Similar relationships have been shown between load and injury risk in elite adult Gaelic football, where 1-, 2-, 3- and 4-weekly cumulative loads increased the risk of injury in the pre-season and competitive in-season (Malone et al., 2017d). Similarly, research in youth soccer has shown players with high accumulated weekly load >474 AU, measured using GPS, have a significantly higher risk of injury (RR = 1.65–4.84) (Bowen et al., 2017). High monotony (OR=2.59) in youth soccer players has also been shown to significantly increase injury risk (Brink et al., 2010). Therefore, monitoring of weekly load and monotony is required in adolescent Gaelic footballers. Internal load measures (monotony, strain and absolute change) were significantly associated with injury using multivariate analysis but demonstrated low sensitivity and high specificity. Research in elite soccer players also identified sRPE-derived loads poorly associated with injury with

low sensitivity and high specificity (Delecroix et al., 2018; Lu et al., 2017). These findings indicate internal load measures may be clinically beneficial at ruling out those not at risk of injury where load modifications may not be necessary. Nonetheless, low sensitivity indicates they may be poor predictors of those at increased injury risk and further assessment of these players may be required, which could include additional monitoring with internal or external measures, such as blood lactate or heart rate monitoring, GPS tracking or accelerometry. However, only 13.0% to 20.2% of the variance in injury is predicted by the model, which may indicate that internal load is not the only predictor of injury and other intrinsic and extrinsic risk factors (Bahr and Holme, 2003), such as previous injury, strength, neuromuscular control, age, equipment or environment (Caine et al., 2008) should be considered.

The univariate analysis also identified those with ACWR greater than 1.30 had a reduced risk of injury but the association was not significant. There is controversy among research regarding the use of ACWR as a load monitoring tool. Mathematical coupling exists when calculating ACWR, which may lead to a false correlation between acute and chronic load, regardless of the true biological or physiological association between the variables (Lolli et al., 2019a; Lolli et al., 2019b). Therefore, it is difficult to conceive a causal relationship between changes in load when no true association is evident. Lolli et al. (2019a) also found that acute load could be a useful injury predictor when examined in absolute numerical terms without the ratio. However, Gabbett (2018) indicate that both coupled (acute load included in chronic load calculation) and uncoupled (acute load excluded from chronic load calculation) ACWR calculations have been associated with increased injury risk in previous research (Malisoux et al., 2013; Moller et al., 2017). Therefore, due to the lack of research examining the use of ACWR in adolescent Gaelic footballers, both ACWR and absolute loads over 1-, 2-, 3- and 4-weekly periods were included in the current analyses. The lack of significant association between ACWR and injury in the current study suggests it may not be a useful measure of internal load in adolescents.

Monitoring load in adolescents is particularly important to reduce missed training or competition time due to injury (Bourdon et al., 2017). Missed days may have a long-term impact on performance, as youth player's need exposure to master the inherent skills of the sport and consistent absences from training may result in underperformance (Murray, 2017). In addition, there is a significant relationship between high volumes of training,

injury and early dropout and retirement from sport, with 17.3% of youth athletes forced to retire because of injury (Huxley et al., 2014). Given this potential negative impact, the prescription of appropriate loads should be central to every training plan to increase competitiveness and team success (Malone et al., 2017d) and facilitate a long sporting career with minimal injuries as players progress to adult sports participation (Murray, 2017). The findings also suggest that despite the benefits of load monitoring for a team, injury risk should not solely be considered for a team as one unit. Load should also be assessed individually as a player may have greater exposure to maximal loads and thus report markedly higher or lower scores compared to teammates (Malone et al., 2020). Players with average weekly load, monotony or strain greater than the weekly team average may be identified as being at increased injury risk and subsequent loads can be altered. This is especially critical in the adolescent population, as 70.1% of adolescents participated in more than one sport resulting in substantial variation in training frequency between players. In order for load monitoring to be successful, open communication between players, parents, coaches and sports medicine clinicians is essential and monitoring across all sports needs to take priority. Prioritising monitoring and identifying which stakeholder is responsible for identifying when decreases in load are necessary is essential. Appropriate load management may subsequently be beneficial in fulfilling adolescent athletic potential, reducing burnout and injury, and promoting longevity of lifelong sports participation (Burgess and Naughton, 2010). However, with many players, a lack of clarity exists into who assumes this responsibility and a priority system for teams and sports may need to be developed for each individual athlete to decide that when load needs to be reduced, where does this occur. These changes can in turn create a safe sporting environment for adolescents that epitomises success (Murray, 2017).

The average weekly load identified in this study was lower than weekly training loads (1217±364 AU) (Phibbs et al., 2018a) and training and match loads (1425±545 AU) (Phibbs et al., 2018b) inclusive of all rugby and non-rugby activities in elite adolescent rugby players. Similarly, the average weekly load was lower than early (2740±610 AU) and late in-season loads (2560±603 AU) previously reported in elite adult Gaelic footballers (Malone et al., 2017d), as would be expected in younger players. Adolescents should ideally be subjected to lower training and match loads compared to adults as they may have increased propensity for injury due to anatomical developmental differences (Malanga and Ramirez–Del Toro, 2008), particularly, the lack of collagen/calcified tissue

during growth periods makes physes, apophyses and articular surfaces less resistant to tensile, shear and compressive forces (DiFiori et al., 2014). Exposure to high levels of training during periods of rapid growth and major physiological change when these structures are vulnerable to injury can increase injury risk (Van der Sluis et al., 2014). Therefore, anatomical and physiological differences need to be accounted for when designing a training regime.

No significant differences in load, monotony or strain were evident between under-14 and under-16 players. Therefore, load monitoring is important across all male adolescent Gaelic footballers, regardless of age, where priority should be placed on avoiding excessive weekly loads or highly monotonous training, as identified in this study. Alternating week-to-week sessions to include a variety of drills and activities that prepare a player for match play demands reduces monotony and allows for more athlete enjoyment, a balanced approach to load management and reduction of illness and overtraining risk (Foster, 1998). By reducing monotony and ensuring load is appropriately planned and managed in younger players, the stress on adolescent Gaelic footballers imposed by training, matches, physical education and recreational activities, as measured by strain, may be reduced and the risk of injury may decrease. In addition, the enjoyment of the game may increase and participation as players' progress to adult level will be maintained.

4.6 Limitations

Training diaries were completed by players present at Gaelic football training sessions. For participants who missed a Gaelic football training session and thus, did not complete a weekly diary, the mean load from the corresponding week (Brink et al., 2010) was used to represent the missing value which likely resulted in over and under-estimation of participation hours. Missing values could have been minimised by requiring the coach to register individual training duration or absences (Brink et al., 2010), which should be considered in future research. The accuracy of sRPE is a suggested limitation of the current study. sRPE is recommended to be measured within 30 minutes post-session for greater accuracy (Comyns and Flanagan, 2013). Retrospective sRPE collection has been shown to remain consistent up to 48 hours (Fanchini et al., 2017), however, beyond that its reliability is questioned (Scantlebury et al., 2018; Phibbs et al., 2017). Thus, future

research in adolescent Gaelic football should consider utilising daily training diaries. Previous research utilised prompts about significant days to help recall activities from the past week (Hartwig et al., 2008) and in this study, coaches were on hand to remind players of each session but did not guide players' ratings. The presence of the coach likely only affected reporting accuracy of Gaelic football hours but additional activities were completed outside of these hours in sub-elite (club and school) and elite (county) settings at various age groups and in recreational activity and physical education in which the coach could not affect reporting accuracy. In addition, use of self-reporting of training information is associated with high typical error in adolescents and younger athletes may have difficulty understanding sRPE (Phibbs et al., 2017). With adequate familiarisation, difficulties with sRPE may be reduced (Phibbs et al., 2017) and efficiency and accuracy of the measure potentially increased. Therefore, a familiarisation session was completed at the beginning of the season to explain the diary in detail to participants.

Despite its benefits, sRPE is a single measure of load. In order to get a more complete and accurate picture of load in adolescent Gaelic footballers, a combination of subjective, objective, internal and external measures should be utilised to give a true insight into training stress and provide a balance between athlete cognitions and quantifiable practice (Bourdon et al., 2017). In addition, internal loads were categorised according to ≤ or > season average, which results in the discretization of continuous data and assumes that each participant has equal risk of sustaining an injury (Carey et al., 2018). However, this approach allows comparison with previous research in adult Gaelic footballers (Malone et al., 2017c) and other studies examining adolescents (Bowen et al., 2017; Brink et al., 2010). Measuring load using sRPE is beginning the process of examining load in adolescent Gaelic footballers but future research should utilise further measures and examine factors that can moderate sRPE ratings.

4.7 Conclusion

Coaches and sports medicine clinicians may effectively minimise injury risk by monitoring applied loads across all adolescent sports participation and avoiding excessive weekly loads or sudden periodic variations that elicit rapid changes in absolute load from week to week. Internal load measures may be associated with those not at risk of injury but further analysis of those who have increased injury risk may be necessary with

additional monitoring tools. Load monitoring on a player-to-player basis may also be beneficial in identifying individuals experiencing high weekly sRPE loads, high monotony or excessive absolute changes week-to-week and at increased risk of injury. Adolescent Gaelic footballers ideally should be subjected to lower loads than their adult counterparts as they transition through rapid growth periods and increased training variability in youth players may be beneficial in avoiding monotony and excessive strain. Nonetheless, high variability in absolute load can be harmful highlighting the importance of avoiding sudden changes in load from week-to-week. However, load monitoring alone cannot be effective in reducing injury risk unless there is open communication between players, coaches, parents and sports medicine clinicians across all sports. Effective monitoring and communication to reduce load when required could minimise the risk of injury, which may subsequently minimise dropout, improve team success and overall sport enjoyment and promote life-long sport participation.

4.8 Summary

This chapter highlighted the association between internal load measures and injury and identified the need for appropriate load management in male adolescent Gaelic footballers to reduce the risk of injury. It is also important to reduce injury risk in adolescent Gaelic footballers as negative psychological responses may be evident following injury and during injury rehabilitation (Ardern et al., 2013), negatively impacting players' mental health. Elite Gaelic footballers with a history of injury have a significantly increased risk of experiencing symptoms of a mental health issue (Gouttebarge et al., 2016). However, there is currently no available research examining the psychological response to injury in adolescent players. Therefore, Chapter 5 will examine the psychological response to injury in male adolescent Gaelic footballers.

Chapter 5. The Psychological Response to Musculoskeletal Injury in Male Adolescent Gaelic Footballers

Publications from this chapter:

O'Keeffe, S., Ní Chéilleachair, N., O'Connor, S. (2020). Fear-Avoidance Following Musculoskeletal Injury in Male Adolescent Gaelic Footballers. *Journal of Sport Rehabilitation.* 29(4), pp.413-419. DOI: 10.1123/jsr.2018-0258

5.1 Abstract

Background: Gaelic football participation provides a wealth of benefits, but a risk of musculoskeletal injury also exists. Injury is associated with physical consequences, including pain, discomfort, loss of function, time absent from school/sport, and considerable medical expenses, along with placing undue pressure on emergency services and hospital staff. Concurrent psychological consequences, such as fear-avoidance, can also occur, causing psychological distress. There is a current dearth of available research examining the psychology of injury in male adolescent Gaelic footballers.

Aim: To examine fear-avoidance post-injury in male adolescent Gaelic footballers, the effect of pain, time loss, injury severity, and previous injury on the extent of fear-avoidance, the usefulness of a modified Athlete Fear-Avoidance Questionnaire (mAFAQ) as a screening tool for predicting injury and psychological readiness to return to play following injury.

Methods: A total of 97 male adolescent sub-elite Gaelic footballers (13.4±1.1 years) were recruited. Musculoskeletal injuries sustained during Gaelic football participation, defined as any injury sustained during training or competition causing restricted performance or time loss from play, were assessed and recorded weekly by a certified athletic therapist. Injuries requiring time loss from participation were classed as time-loss injuries. Injury characteristics that included type, nature, location, severity, and pain were recorded. Injured players completed the AFAQ, a measure of injury-related fear-avoidance following injury assessment (AFAQ1). With time-loss injuries, the AFAQ was completed again (AFAQ2) prior to return to play, in addition to the Injury-Psychological Readiness to Return to Sport (IPRRS). mAFAQ was completed at baseline.

Results: Twenty-two injuries were recorded during the season with fear-avoidance evident post-injury that significantly decreased before returning to play. Fear-avoidance post-injury was higher in those with greater pain but time loss, injury severity, and previous injury did not significantly affect the extent of fear-avoidance. The majority of participants returning to play following a time-loss injury were not psychologically ready. Baseline fear-avoidance did not predict injury.

Conclusion: Psychological rehabilitation is recommended for managing post-injury psychological distress in male adolescent Gaelic footballers.

5.2 Introduction

The GAA plays an important role in the physical activity practices of Irish society, with Gaelic football recognised as the most popular club sport for adolescent males (Murphy et al., 2017; O'Connor et al., 2016a). Gaelic football is a high-intensity, high-velocity contact game that requires large volumes of strength, endurance, flexibility, and speed (McIntyre, 2005), where the primary aim of the game is to outscore the opposing team (Murphy et al., 2012). Matches last up to 60 minutes in duration in adolescents (O'Connor et al., 2016a) and players may be involved with sub-elite (club and school) and elite (county) teams simultaneously. Gaelic football participation is associated with an inherent risk of musculoskeletal injury (Caine et al., 2008). Musculoskeletal injuries, defined as injuries sustained during sports participation resulting from direct trauma or overuse (Thein-Nissenbaum et al., 2011), are common in male adolescent Gaelic footballers, with one-third of all players sustaining an injury over 1 year, and almost half of injured participants suffering a subsequent injury (O'Connor et al., 2016a).

Musculoskeletal injuries can elicit negative emotional responses that stimulate feelings of depression, anxiety, low vigour, fatigue, grief, and burnout, with depression and anger also negatively affecting wound healing (Wiese-Bjornstal, 2010). Cognitive appraisal of the injury situation and the psychological response to injury is subjective to each athlete (Masten et al., 2014; Lu and Hsu, 2013), where one athlete may perceive their injury situation to be more stressful than a teammate's perception of a similar situation. Although negative emotional post-injury responses, such as frustration, mild depression, and irritability, may be normal (Pearson and Jones, 1992), it is estimated that 10.0% to 20.0% of athletes report extreme post injury responses, including clinical levels of depression, low self-esteem, and suicidal ideation, indicating the need for clinical referral (Wiese-Bjornstal, 2010). Concern is warranted when the psychological responses are excessive, do not resolve or exacerbate over time or if the athlete is unable to cope (Putukian, 2016). Injured athletes report depression symptoms that are similar to levels of depression reported by patients receiving outpatient medical treatment for mental health issues (Leddy et al., 1994), which highlights the extent of psychological distress post-injury. Research to date has shown that elite male Gaelic footballers who have sustained one or more severe musculoskeletal injuries during their career increase their chances of experiencing symptoms of psychological distress compared with those who had not suffered severe musculoskeletal injuries during their career (Gouttebarge et al.,

2016). In addition, a history of injury results in an increased risk of re-injury (Caine et al., 2008; Meeuwisse et al., 2007).

The importance of psychological rehabilitation in conjunction with physical rehabilitation is becoming increasingly recognised as a necessity for holistic recovery from injury. According to the integrated model of response to sport injury, the psychological reaction to injury is dependent upon situational and personal factors, along with differing behavioural and emotional responses to an injury situation (Wiese-Bjornstal et al., 1998). Fear-avoidance, defined as the avoidance of movements or activities based on fear, is a psychological reaction to injury that can influence the experience of pain (Vlaeyen and Linton, 2000) and subsequently lead to dysfunction (Dover and Amar, 2015), which may hinder recovery and rehabilitation following injury. Musculoskeletal injury can elicit pain-related fear-avoidance behavioural responses, which stimulate either a confrontation or avoidance approach in the injured player (Vlaeyen and Linton, 2000). With confrontation, athletes maintain engagement in physical activity through rehabilitation and involvement in the team environment where functional recovery is promoted (Leeuw et al., 2007). By contrast, dysfunctional interpretations of pain escalate pain-related fear, forcing the athlete to adopt safety-seeking avoidance behaviours (Leeuw et al., 2007). These avoidance behaviours can reinforce mood disturbances, such as irritability, frustration, and depression (Vlaeyen and Linton, 2000).

Fear-avoidance has predominantly been measured to date in patients from the general population with chronic low back pain, or those who have undergone anterior cruciate ligament reconstruction utilising the Tampa Scale for Kinesiophobia (TSK), Pain Catastrophizing Scale (PCS) and the Fear-Avoidance Beliefs Questionnaire (FABQ) (Tripp et al., 2007; Sullivan et al., 2000; Waddell et al., 1993). However, these questionnaires were not developed primarily for use with athletes and have not been validated in physically active cohorts. The Athlete Fear-Avoidance Questionnaire (AFAQ) is a measure of sports injury-related fear-avoidance developed specifically for use with athletes (Dover and Amar, 2015). Athletes are viewed as having different mental traits than the general population due to their greater reliance on sport and physical activity and, thus, require a unique questionnaire (Dover and Amar, 2015). AFAQ is a valid tool for measuring fear-avoidance in athletes, and it can be easily administered efficiently in a short period of time (Dover and Amar, 2015).

Returning a player to sport without the necessary psychological capacity can lead to fear, anxiety, re-injury, injury to other parts of the body, depression, or an overall decline in performance (Quinn and Fallon, 1999). The implementation of psychological interventions post-injury can moderate any dysfunctional beliefs that may hinder the rehabilitation phase (Masten et al., 2014). However, in order to facilitate recovery, an adequate understanding of the psychological processes involved with injury is essential (Masten et al., 2014; Walker et al., 2004), and in particular, an understanding of players confidence and psychological readiness to return to sport post-injury (Glazer, 2009).

No research to date has examined fear-avoidance, the effect of associated injury characteristics on fear-avoidance or psychological readiness to return to play post-injury in the Gaelic football population. Examining the psychological effect of injury in adolescent Gaelic footballers is crucial, as younger athletes, aged less than 18 years, are at an increased risk of experiencing injury-related psychological distress (Appaneal et al., 2009). Managing the psychological response to injury in the adolescent years may teach the young players how to manage the psychological symptoms associated with athletic injury when they progress into adult-level Gaelic football, allowing for longer and more successful sports participation. Thus, this study aimed to examine fear-avoidance as a psychological response to injury in male adolescent Gaelic footballers and their psychological readiness to return to play post-injury.

5.3 Methodology

5.3.1. Participants

A total of 97 male adolescent Gaelic football players (13.4±1.1 years) who played at under-14 (N=66) and under-16 (N=31) were conveniently recruited from three Gaelic football teams in county Westmeath. Participants were required to be an adolescent male, Gaelic footballer and member of a recruited under-14 or under-16 sub-elite Gaelic football team to be included in the study. Parental/guardian written informed consent and participant assent (Appendix T) were granted prior to the study beginning following an information session as detailed in Section 3.3.1. Ethical approval was granted by the AIT Research Ethics Committee (#20161125).

5.3.2. Measures

The validated AFAQ (Dover and Amar, 2015) (Appendix F) is composed of 10 statements detailing an athlete's post-injury fear-avoidance thoughts and feelings (Table 5.1). Each statement is rated on a 5-point Likert scale from 1 (not at all) to 5 (completely agree) and summed to give a total fear-avoidance score. The total score ranges from 10 to 50, with a greater overall AFAQ score indicating greater fear-avoidance. AFAQ showed significant correlations with previously validated catastrophizing and fear-avoidance assessment tools, indicating validity of the measure (Dover and Amar, 2015). The AFAQ was modified (mAFAQ) to create a screening tool for fear-avoidance (Table 5.2) (Appendix X). Each of the 10 statements were adapted by adding "If I was injured" in order to measure injury-related fear-avoidance that a player expects they would experience if they became injured. The mAFAQ was ranked and scored the same as the original AFAQ. A pilot study was conducted in recreational athletes from a variety of sports (N=120; 20.1±3.9 years) to examine the psychometric properties of the mAFAQ. Internal consistency was evident with Cronbach α coefficient of 0.733, indicating high reliability (Hinton et al., 2004). Construct validity was determined by factor analysis, which identified eigenvalues >1 for 3 items of the mAFAQ, explaining a cumulative percentage variance of 57.2%. However, the first item accounted for 30.7% of the variance, indicating the mAFAQ is a one-dimensional scale. The original AFAQ was also identified as being a one-dimensional scale, and the findings suggest that both questionnaires measure different traits of the fear-avoidance model, including fear-avoidance beliefs, kinesiophobia, and catastrophizing (Dover and Amar, 2015). The results identify mAFAQ as a valid and reliable measure of baseline fear-avoidance.

The IPRRS (Glazer, 2009) (Appendix J) is a validated measure of athlete confidence when returning to play following musculoskeletal injury. The questionnaire consists of six statements, each scored from 0 to 100, relating to an athlete's confidence to return to sport (Table 5.3). A score of 0, 50 and 100 represents no confidence, moderate confidence and complete confidence respectively. The scores for each of the six statements are summed and divided by 10 to give a final score. A final score between 50 and 60 indicates the player is psychologically ready to return to play whereas a score less than 50 indicates the player may not be psychologically ready to return to play and further rehabilitation is necessary.

Table 5.1 AFAQ statements (Dover and Amar, 2015)

1.	I will never be able to play as I did before my injury.
2.	I am worried about my role with the team changing.
3.	I am worried about what other people will think of me if I don't perform at the same level.
4.	I am not sure what my injury is.
5.	I believe that my current injury has jeopardised my future athletic abilities.
6.	I am not comfortable going back to play until I am 100%.
7.	People don't understand how serious my injury is.
8.	I don't know if I am ready to play.
9.	I worry if I go back to play too soon I will make my injury worse.
10.	When my pain is intense, I worry that my injury is a very serious one.

Table 5.2 Modified AFAQ statements

1.	If I was injured, I would never be able to play as I did before my injury.
2.	If I was injured, I would be worried about my role with the team changing.
3.	If I was injured, I would be worried about what other people will think of me if I don't perform at the same level.
4.	If I was injured, I would not be sure what my injury is.
5.	If I was injured, I would believe that my current injury has jeopardised my future athletic abilities.
6.	If I was injured, I would not be comfortable going back to play until I am 100%.
7.	If I was injured, people would not understand how serious my injury is.
8.	If I was injured, I would not know if I was ready to play.
9.	If I was injured, I would worry if I go back to play too soon I would make my injury worse.
10.	If I was injured and my pain is intense, I would worry that my injury is a very serious one.

Table 5.3 IPRRS statements (Glazer, 2009)

1.	My overall confidence to play is ____
2.	My confidence to play without pain is ____
3.	My confidence to give 100% effort is ____
4.	My confidence to not concentrate on the injury is ____
5.	My confidence in the injured body part to handle the demands of the situation is ___
6.	My confidence in my skill level/ability is ____

5.3.3. Testing Procedure

An injury history questionnaire documenting injuries sustained in the previous 12 months and their characteristics was completed at the beginning of the season. Injury history was limited to the previous 12 months to minimize recall errors associated with the collection of retrospective injury data (Gabbe et al., 2003). Participants also completed the mAFAQ to screen for fear-avoidance at the beginning of the season.

Injuries were recorded by the primary researcher, as detailed in Section 3.3.2.2. Injuries that required the participant to miss time from Gaelic football participation were classed as time-loss injuries, whereas non-time-loss injuries did not require the participant to miss participation from Gaelic football. Immediately following the injury assessment, the injured participant completed the AFAQ (Dover and Amar, 2015), which will be termed the AFAQ1 for clarification purposes in this thesis. Those who sustained a time-loss injury completed the AFAQ a second time immediately before their first training or match when returning to play, termed the AFAQ2. Participants who sustained a time-loss injury also completed the IPRRS (Glazer, 2009).

5.3.4. Statistical Analysis

Data were analysed using IBM SPSS (version 24; IBM, New York, USA). Normality was examined using the Shapiro-Wilk test, which identified normally distributed data with a significance value greater than 0.05. The mean and standard deviation were calculated for the score of each individual statement and overall mAFAQ, AFAQ1, and AFAQ2 scores. Independent samples t-tests compared the difference between AFAQ1 scores for time loss and non-time-loss injuries. Paired samples t-tests compared AFAQ1 and AFAQ2 scores in those who sustained a time-loss injury and mAFAQ and AFAQ1 scores in participants who sustained an injury during the season. Effect sizes for t-tests, calculated using eta squared, were determined according to Cohen's d classification: small=0.01, moderate=0.06, and large=0.14 (Cohen, 1988).

Pearson product moment correlations identified the relationship between (1) mAFAQ, AFAQ1, AFAQ2, and time loss from Gaelic football participation, (2) AFAQ1, AFAQ2, and VAS pain rating, (3) IPRRS and mAFAQ, AFAQ1 and AFAQ2 scores for participants who sustained a time-loss injury and (4) time-loss from Gaelic football participation and IPRRS. Correlations were interpreted using the following

classifications: 0-0.19=very weak, 0.20-0.39=weak, 0.40-0.59=moderate, 0.60-0.79=strong and 0.80-1.00=very strong (Evans, 1996). Multiple regression analysis was performed to determine if AFAQ1 scores could be predicted by injury severity and injury history in the previous 12 months. Multicollinearity of the multiple regression analysis was first examined by inspecting the correlation coefficients and variance inflation factors, with high correlation ($r>0.9$) and variance inflation factor (>10) indicating multicollinearity. No multicollinearity was noted. Adjusted R^2, which explains how much of the variance in the dependent variable is explained by the model, was utilised to explain the variance in the outcome variable. Adjusted R^2 was utilised for its increased accuracy over R^2, which tends to be an optimistic overestimation of the true value in the population (Miles, 2014). Logistic regression was conducted to analyse if total mAFAQ score predicts injury, with ORs and 95%CI examined. An OR value greater than 1 indicated an increased risk of injury. A significance level of 0.05 was set for all statistical tests ($P\leq.05$).

5.4 Results

5.4.1. AFAQ

Twenty-two injuries were recorded over the season, 4 of which resulted in time loss from play, with 18 non-time-loss injuries. The nature of injuries that required time loss were ligament sprains (N=3) and tendinopathies (N=1). Injury history identified that 54.6% of participants sustained an injury in the previous 12 months, with 21.6% reporting 2 or more injuries. The epidemiology of all injuries recorded is presented in detail in Chapter 3.

The average mAFAQ score for all participants at baseline was 23.3±6.0 (Table 5.4). Average AFAQ1 and AFAQ2 scores for time-loss and non-time-loss injuries are presented in Table 5.5. No significant differences were evident between average total AFAQ1 scores for time-loss (26.8±4.9) and non-time-loss injuries (21.0±7.2) ($t(20)=1.52$; $P>0.05$; $\eta^2=0.10$). However, significant differences were identified between AFAQ1 scores for time-loss and non-time-loss injuries for question 1 ($t(20)=2.23$; $P=0.04$; $\eta^2=0.20$), question 4 ($t(20)=3.52$; $P<0.001$; $\eta^2=0.38$) and question 8 ($t(12)=3.06$; $P=0.01$; $\eta^2=0.32$). AFAQ1 scores (26.8±4.9) were statistically greater than AFAQ2 scores (14.3±4.9) in those who sustained a time-loss injury, with a large effect size ($t(3)=5.64$; $P=0.01$; $\eta^2=0.91$). In addition, there was no significant difference between mAFAQ and

AFAQ1 in those who sustained an injury during the season (t(21)=1.50; P>0.05; η^2=0.10). No significant relationships were evident between mAFAQ, AFAQ1, AFAQ2, and days lost from Gaelic football participation (r=-0.52 to 0.60; P>0.05). A significant moderate positive correlation was evident between AFAQ1 and VAS at the time of injury (r=0.56; P=0.01) and a strong positive correlation was evident between AFAQ1 and VAS at the time of injury assessment (r=0.60; P<0.01). No significant correlations were evident between AFAQ2 and VAS pain rating (r=−0.16 to −0.34; P>0.05).

Table 5.4 Average baseline mAFAQ scores

	All participants (N=97)	Injured participants (N=20)	Non-injured participants (N=77)
mAFAQ		**M (SD)**	
Question 1	1.6 (0.9)	1.6 (0.9)	1.6 (0.9)
Question 2	2.0 (1.1)	2.1 (1.1)	2.0 (1.1)
Question 3	2.0 (1.1)	1.9 (1.0)	2.1 (1.1)
Question 4	2.2 (1.3)	2.5 (1.4)	2.2 (1.3)
Question 5	2.0 (1.1)	1.9 (1.1)	2.1 (1.1)
Question 6	2.2 (1.3)	2.4 (1.4)	2.2 (1.3)
Question 7	2.5 (1.2)	2.7 (1.1)	2.5 (1.2)
Question 8	2.5 (1.2)	2.5 (1.1)	2.5 (1.3)
Question 9	2.8 (1.5)	3.0 (1.6)	2.8 (1.5)
Question 10	3.3 (1.5)	3.1 (1.5)	3.4 (1.5)
Total	23.3 (6.0)	23.5 (6.1)	23.3 (6.0)

Note: mAFAQ=modified Athlete Fear-Avoidance Questionnaire; M=mean score; N=number of participants; SD=standard deviation

Table 5.5 Average AFAQ1 and AFAQ2 scores for time-loss and non-time-loss injuries

	AFAQ1			AFAQ2
	Time-loss injuries	**Non-time-loss injuries**	**All participants**	**Time-loss injuries**
	M (SD)			
Question 1	2.8 (1.3)	1.6 (0.8)	1.8 (1.0)	1.3 (0.5)
Question 2	2.3 (1.3)	2.1 (1.2)	2.1 (1.2)	1.3 (0.5)
Question 3	2.5 (0.6)	2.6 (1.4)	2.6 (1.3)	2.0 (1.4)
Question 4	3.3 (1.0)	1.6 (0.9)	1.9 (1.1)	1.8 (1.5)
Question 5	2.3 (1.0)	1.7 (0.7)	1.8 (0.8)	1.0 (0.0)
Question 6	3.3 (1.0)	2.4 (1.4)	2.6 (1.3)	1.5 (0.6)
Question 7	1.8 (0.5)	2.1 (0.9)	2.0 (0.8)	1.5 (1.0)
Question 8	3.5 (0.6)	2.2 (1.4)	2.4 (1.4)	1.0 (0.0)
Question 9	3.0 (1.2)	2.6 (1.4)	2.6 (1.3)	1.5 (0.6)
Question 10	2.3 (1.5)	2.3 (1.3)	2.3 (1.3)	1.5 (0.6)
Total	26.8 (4.9)	21.0 (7.2)	22.0 (7.1)	14.3 (4.9)

Note: AFAQ1=Athlete Fear-Avoidance Questionnaire completed following injury assessment; AFAQ2=Athlete Fear-Avoidance Questionnaire completed prior to return to play; M=mean score; SD=standard deviation

Multiple regression analysis identified that injury severity and previous injury explain 8.1% of the variance in AFAQ1 scores in those who sustained an injury during the season, however, the model was not found to be statistically significant ($F(2,19)=1.93$; $P>0.05$; $R^2=0.081$). Injury severity ($\beta=0.24$; $t=1.13$; $P>0.05$) and previous injury ($\beta=-0.28$; $t=1.13$; $P>0.05$), when examined individually, did not contribute significantly to the model. Baseline fear-avoidance was not a significant predictor of injury, explaining 0.6% to 0.9% of the variance ($P>0.05$). However, the odds of sustaining an injury was slightly higher for those with higher baseline fear-avoidance (OR=1.03; 95%CI=1.0-1.1; $P>0.05$).

5.4.2. IPRRS

Average IPRRS scores (43.0±7.3; range: 36-53) for the injured participants who sustained a time-loss injury are presented in Table 5.6. The total average score is representative of the sum of all questions divided by 10 (Glazer, 2009). Three out of four participants with time-loss injuries were classified as not being psychologically ready to return to sport

participation as they scored below the 50 to 60 score indicating a player is psychologically ready to return to play. No significant relationships were evident between IPRRS and mAFAQ, AFAQ1 or AFAQ2 for participants who sustained a time-loss injury (r=-0.93 to -0.25; P>0.05). Similarly, no significant relationship was observed between IPRRS and time loss from Gaelic football participation (r=0.74; P>0.05).

Table 5.6 Average IPRRS scores

	M (SD)
Question 1	85.0 (12.9)
Question 2	62.5 (25.0)
Question 3	87.5 (25.0)
Question 4	60.0 (20.0)
Question 5	55.0 (33.2)
Question 6	80.0 (24.5)
IPRRS Score	43.0 (7.3)

Note: M=mean score; SD=standard deviation

5.5 Discussion

This study aimed to establish the extent of fear-avoidance post-injury in male adolescent Gaelic footballers, the effect of pain, days lost from Gaelic football participation, injury severity and previous injury on the amount of fear-avoidance reported, and the usefulness of a modified AFAQ as a screening tool for predicting injury.

5.5.1. AFAQ

5.5.1.1. Fear-Avoidance Post-Injury

The average AFAQ score reported in this study (22.1±7.1) is similar to that of a sample of currently injured and previously injured collegiate athletes (N=103) from a variety of sports (23.7±7.0) (Dover and Amar, 2015) and a sample of adults (N=102; 25±8.5 years) with a sports-related injury (26.0±8.0) (Fischerauer et al., 2018). Despite age differences between the adolescent, collegiate, and adult participants, similar fear-avoidance is evident, outlining that adolescent Gaelic footballers experience psychological distress levels comparable with their adult counterparts. In addition, significant differences were evident between scores for AFAQ1 questions 1, 4 and 8 for participants who sustained a time-loss injury compared to those with a non-time-loss injury. These findings indicate

that time-loss may have an effect on players' fear-avoidance related to not being able to play the same as before their injury, not being aware what the injury is and not knowing if they are ready to play. No research to date has identified fear-avoidance in Gaelic footballers, therefore, comparisons with other Gaelic football populations are unable to be completed. Nevertheless, there is a clear necessity for psychological intervention programs following injury in those who display fear-avoidance.

5.5.1.2. Fear-Avoidance and Pain

Fear-avoidance post-injury was higher in those with greater pain scores as measured by the VAS. Similar findings were found between pain and fear-avoidance in adults with a sports-related injury (Fischerauer et al., 2018), in physically active individuals with osteoarthritis (Bhatt et al., 2015), and in patients with acute (Fritz et al., 2001) and chronic low back pain (Gheldof et al., 2010). These results support the fact that pain tolerance is a moderator of the psychological response to injury (Wiese-Bjornstal et al., 1998) and that it has significant physical and psychological effects on recovery (Crossman, 1997). By contrast, fear-avoidance has been defined as the fear of pain in chronic low back pain literature to date (Waddell et al., 1993; Lethem et al., 1983). The lack of a significant relationship between fear-avoidance prior to return to play and VAS pain ratings, which indicates that pain experienced when the injury was sustained does not relate to fear-avoidance prior to return to play, highlights that this definition of fear-avoidance may not be appropriate in a high functioning, physically active population. If fear-avoidance was solely to describe a fear of pain, an association between fear-avoidance and pain would be anticipated at any point following injury, particularly at a point of return to play post-injury. Fear-avoidance in injured athletes may instead be associated with the greater injury experience and the avoidance of movements or activities based on fear (Vlaeyen and Linton, 2000) and the negative emotional response to injury that stimulate feelings of depression, anxiety, low vigour, fatigue, grief, and burnout (Wiese-Bjornstal, 2010).

5.5.1.3. Fear-Avoidance, Time Loss, and Injury Severity

Similar fear-avoidance was identified for participants who sustained time loss and non-time-loss injuries, which suggests that the duration of time loss from Gaelic football participation does not affect the extent of fear-avoidance. In addition, no significant relationships were noted between the duration of time loss from Gaelic football participation and fear-avoidance at baseline, post-injury, and prior to return to play. However, this finding conflicts with previous research that identified time-loss duration

as a moderator of the psychological response to injury (Wiese-Bjornstal et al., 1998). Time-loss duration may not be a moderating factor in this study due to the low number of injuries that required missed participation from Gaelic football. Current injury severity (i.e., minor, moderate, or severe based on the number of days lost from Gaelic football participation) was also not a significant predictor of fear-avoidance post-injury, despite previous research identifying that more severely injured athletes experienced greater mood disturbances following injury when compared with those who suffered moderate to acute injuries (Masten et al., 2014). Most injuries in this study were minor in nature, requiring less than 7 days of absence from Gaelic football participation, and only 4 time-loss injuries were noted, which may have impacted this finding. The lack of significant difference between fear-avoidance in participants who sustained time loss and non-time-loss injuries and the lack of interaction between injury severity, days lost from Gaelic football participation, and fear-avoidance could be attributed to the prevalence of male adolescent Gaelic footballers who continue to play through injury (O'Connor et al., 2016a). Playing through injury results in no time loss from Gaelic football participation, which thus means that time loss may not affect fear-avoidance in this youth sample of the population. In addition, fear-avoidance was measured following the injury assessment, where participants were aware of the nature of their injury, but the extent of time loss from Gaelic football participation was not clear at that time.

5.5.1.4. Baseline Fear-Avoidance

Fear-avoidance was evident at the beginning of the season, but greater fear-avoidance did not increase the likelihood of sustaining an injury over 1 season. Similarly, fear-avoidance following injury was not significantly greater than baseline fear-avoidance, and previous injury did not predict fear-avoidance post-injury. To our knowledge, no research to date has identified fear-avoidance at baseline prior to sustaining an injury, so comparisons with similar research cannot be made. The baseline mAFAQ measured players' perceptions of fear-avoidance at the start of the season that may be experienced if they became injured. However, male adolescents' perceptions of their fear-avoidance may differ from their actual fear-avoidance experienced post-injury. Situational factors (level of competition, time in season, playing status, teammate/coach influences, family dynamics, or social support), personal factors (player demographics, injury characteristics, injury history, pain tolerance, motivation, athletic identity, social support, or mood states), or behavioural and emotional responses (risk taking behaviours,

rehabilitation adherence, tension, anger, depression, grief, or emotional coping) can alter the psychological response to injury (Wiese-Bjornstal et al., 1998). The stress-athletic injury model highlights that an athlete who exhibits increased amounts of stress due to their personality, history of stressors, or subjective coping resources may be at increased risk of sustaining an injury (Williams and Andersen, 1998). Therefore, fear-avoidance is highly subjective and situationally based, so solely implementing baseline screening or post-injury measurement of fear-avoidance may not be useful. Instead, clinicians should consider measuring other similar constructs, such as coping resources, history of life stressors and personality traits at the beginning of the season, which may increase the risk of injury, but also measure fear-avoidance post-injury that may overwhelmingly influence the physical and psychological responses to injury that have the potential to hinder rehabilitation.

5.5.1.5. Fear-Avoidance Prior to Return to Play

Male adolescent Gaelic footballers experience fear-avoidance and psychological distress when they sustain an injury, but following a period of time loss from Gaelic football participation and rehabilitation, fear-avoidance reduces. Similar trends have been identified in previous research, with negative emotions of tension, depression, anger, fatigue, and confusion shown to decrease from the time of injury evaluation to the point of full recovery (Quinn and Fallon, 1999). This difference could be due to the benefits of rehabilitation and the return to play process, which focus on returning the athlete to sports participation and their preinjury level of performance (Brukner, 2012). Meeting rehabilitation goals and successfully improving the components of performance, such as strength, flexibility, and proprioception, could potentially help to reduce fear-avoidance by improving confidence in the injured body part. However, only 4 time-loss injuries were observed, so the clinical applicability of this finding is limited. A clearer image of fear-avoidance in participants who sustain a time-loss injury may be evident, with a greater number of time-loss injuries.

5.5.2. IPRRS

The majority of participants who sustained a time-loss injury did not report confidence that indicated psychological readiness to return to play. Psychological rehabilitation techniques have been shown to reduce negative psychological consequences of injury, improve psychological coping and reduce re-injury anxiety (Reese et al., 2012). Despite the benefits of psychological post-injury rehabilitation, sports medicine clinicians may

not be utilising psychological techniques to improve confidence before returning to play in male adolescent Gaelic footballers who report injuries requiring time loss from participation. More work needs to be done with male adolescent Gaelic footballers as a lack of confidence in their Gaelic football playing abilities may delay return to sport, increase risk of injury or may result in dropout from sports participation. Improving adolescent's confidence is essential as these players' progress to playing Gaelic football at adult level. In addition, no significant relationships were evident between IPRRS and mAFAQ, AFAQ1 or AFAQ2 or between IPRRS and time loss from Gaelic football participation. However, the low number of participants who sustained a time-loss injury in this study (N=4) limits the credibility of the findings related to IPRRS, restricting real-world effectiveness. Further research needs to examine a larger cohort with significant statistical power in order to truly examine the extent of psychological readiness to return to play and the relationship between fear-avoidance and psychological readiness to return to play.

5.6. Limitations

A substantially low number of time-loss injuries were observed in this study, which may be due to the short season over which data were collected. The small number of time-loss injuries may impact the ability of this study to examine time-loss and its relationship to fear-avoidance and psychological readiness to return to play post-injury. Furthermore, injury history was only determined for injuries sustained by participants in the previous 12 months in order to reduce the effects of recall bias. However, previous injury is a risk factor for re-injury, and its relationship with the extent of fear-avoidance at baseline and following injury may be different when examined over a longer period. In addition, this study failed to account for the occurrence of serious traumatic injury occurring greater than 12 months previous requiring surgical repair and substantial rehabilitation, despite the fact that these injuries may still incite increased levels of fear greater than 12 months post-injury. However, the incidence of sports injuries in youth participants requiring operative treatment is expected to be low, with only 8.8% of sports injuries presenting to paediatric hospitals requiring surgery (O'Toole et al., 2008), and 6.7% of adolescents requiring surgery due to a Gaelic football injury (O'Connor et al., 2016a). In addition, this study solely examined fear-avoidance in male adolescent Gaelic footballers, which makes it difficult to apply the findings to collegiate and elite players or female Gaelic

footballers. Future research should examine fear-avoidance and the psychological reaction to musculoskeletal injury across Gaelic football populations in a larger cohort of male adolescents and across a number of seasons.

5.7. Conclusions

Fear-avoidance is evident in male adolescent Gaelic footballers comparable with levels experienced by injured collegiate and adult athletes. Fear-avoidance post-injury was higher in those with greater pain scores. However, baseline measures of fear-avoidance did not predict the likelihood of sustaining an injury over 1 season, which indicated that fear-avoidance should be examined when a Gaelic footballer sustains an injury. In addition, confidence when returning to play following injury is poor in male adolescent Gaelic footballers. The findings highlight the need for psychological rehabilitation in conjunction with physical rehabilitation in the management of an injured Gaelic footballer and his successful return to sport. Awareness of the extent of fear-avoidance in injured players allows clinicians to design an effective rehabilitation plan that can manage both the physical and psychological recovery required and may consequently reduce the period of time loss from participation.

5.8 Summary

The current findings highlight the prevalence of negative psychological responses to injury in male adolescent Gaelic footballers, with the extent of psychological responses reported similar to levels experienced by adults. Understanding the psychological response to injury is important as injury may be perceived as a significant stressor that can initiate or exacerbate the experience of mental health issues in athletes (Sarkar and Fletcher, 2014). However, the peak onset of mental health issues in young people is during late adolescence and early adulthood (Rice et al., 2016), which coincides with the peak period of Gaelic football participation. Therefore, a greater understanding of the psychological response to injury in adult Gaelic footballers is necessary to support players' mental health when injured. However, seeking help when experiencing mental issues is not prevalent in athletes (Gorczynski et al., 2019) or young Irish people (Chambers et al., 2015). Therefore, Chapter 6 aims to explore why help-seeking is not common by examining the barriers and facilitators to professional mental health help-seeking perceived by elite and sub-elite adult Gaelic footballers.

Chapter 6. Barriers and Facilitators to Mental Health Help-Seeking in Elite and Sub-Elite Gaelic Footballers Post-Injury

Publications from this chapter:

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O'Keeffe, S., O'Connor, S., Campbell, M., Ní Chéilleachair, N. (2021). A Qualitative Examination of Factors Inhibiting and Facilitating Professional Mental Health Help-Seeking Following Injury in Sub-Elite Gaelic Footballers.

6.1 Abstract

Background: Mental health issues are common in Gaelic footballers, with a history of severe injury significantly increasing the risk of experiencing symptoms of a mental health issue (Gouttebarge et al., 2016). However, the prevalence of mental health issues is not equivalent to the rate of professional help-seeking, with reluctance to seek-help acknowledged as one of the greatest obstacles in efficient management of mental health issues. In addition, young people often prefer informal help sources, who may be untrained and inexperienced to provide help and support.

Aim: To examine perceived barriers and facilitators to professional mental health help-seeking in elite and sub-elite male and female Gaelic footballers post-injury.

Methods: Elite male (N=14) and female (N=12) and sub-elite male (N=14) and female (N=13) Gaelic footballers, with a history of moderate or severe injury, were recruited to participate in a focus group. Group discussions began with a written task where participants noted perceived barriers to help-seeking followed by a group discussion of these barriers. Following discussion, participants completed a ranking task, identifying the barriers most important in stopping a player from seeking professional mental health help following injury. The initial written task, group discussion and ranking task were repeated for help-seeking facilitators. Focus groups were audiotaped, transcribed and thematically analysed.

Results: Lack of education, stigma, negative attitudes to help-seeking, accessibility issues and characteristics of the help-provider were identified as key barriers to help-seeking among elite and sub-elite Gaelic footballers. In contrast, education, the attitudes, actions and opinions of others and accessibility were perceived as factors facilitating professional mental health help-seeking following injury.

Conclusions: Given the negative psychological responses that can accompany injury, there is a need for facilitation and encouragement of help-seeking among players experiencing mental health issues post-injury. Interventions aimed at reducing identified barriers must be introduced and professional mental health help-seeking facilitated to ensure Gaelic footballers are managing their mental health post-injury.

6.2 Introduction

There is recent growing attention internationally on elite and sub-elite athletes' mental health (Chang et al., 2020; Henriksen et al., 2019; Reardon et al., 2019; Van Slingerland et al., 2019; Moesch et al., 2018; Schinke et al., 2018). The experience of mental health issues in athletes is a continually debated topic. Considerations for whether athletes experience mental health issues because of their sports participation, if they would have experienced mental health issues anyway with an alternative life path or if sports participation is a protecting factor as long as the athlete is still involved in sport are important (Lebrun and Collins, 2017). Nonetheless, mental health is a human lived experience and dynamic feature of life (Henriksen et al., 2019) and sport culture can influence how athletes live, express and react to mental health issues (Doherty et al., 2016).

With participation in Gaelic football, players face intense physical and mental demands. Despite being classed as an amateur sport, where players do not receive payment when participating, elite Gaelic footballers are subjected to preparation, training and competitive demands similar to that of professional sport and are similarly required to balance their personal lives (relationships/family) (Beasley, 2015). The key difference between professional sports and amateur Gaelic football lies within the additional burden of professional (work/study) commitments (Beasley, 2015), in addition to travel and geographical issues (Kelly et al., 2018) Gaelic footballers are exposed to. Sub-elite players may face similar physical and mental demands as their elite counterparts, while also balancing their personal and professional lives, but often are exposed to lower levels of training and preparation and are less likely to receive the same level of conditioning (Mangan et al., 2020; Wilson et al., 2007). It is estimated only 0.3% of sub-elite players are selected as elite athletes (Mangan et al., 2020) and thus, the sub-elite level represents the broadest playing population in Gaelic football (McGuigan et al., 2018). Therefore, considerations for differences between playing levels and the demands on participants at elite and sub-elite levels are important when examining the mental health of Gaelic footballers.

Research shows mental health issues are prevalent in Gaelic footballers, with 48.0% of elite players reporting symptoms of anxiety or depression (Gouttebarge et al., 2016) and 37.0% of collegiate Gaelic players reporting mild depression (Sheehan et al., 2018).

Symptoms of mental health issues, such as distress, sleep disturbances and adverse alcohol use are also common (Gouttebarge et al., 2016). Personal everyday stressors may initiate or exacerbate mental health issues (Sarkar and Fletcher, 2014; Hughes and Leavey, 2012). Players are also exposed to additional competitive (e.g., pressure to perform, performance expectations, rivalry) and organisational stressors (e.g., external expectations, public and media scrutiny, travel, facilities and equipment) (Sarkar and Fletcher, 2014). It is suggested that players may be exposed to over 600 distinct stressors that can elicit symptoms of a mental health issue (Gouttebarge et al., 2016).

Injury is regarded as a noteworthy stressor that can exacerbate mental health issues in athletes (Rice et al., 2016; Gulliver et al., 2015; Sarkar and Fletcher, 2014; Nixdorf et al., 2013; Ardern et al., 2013; Walker et al., 2007). Severe injuries account for 20.0% to 41.6% of all injuries occurring in Gaelic football (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; Murphy et al., 2012; Newell et al., 2006; Cromwell et al., 2000). The incidence of more than one severe injury during a Gaelic footballers sporting career can result in an increased risk of experiencing distress (RR=3.4; $P<0.05$) or anxiety/depression (RR=3.1; $P<0.05$) (Gouttebarge et al., 2016). Injury may be viewed as a non-normative transition from sport (Stambulova, 2017), where a player's athletic identity and their self-determined roles and responsibilities and personal identity tied up with their sporting commitments can become threatened (Pike, 2018; Brewer et al., 1993). The non-autonomous and unpredictable nature of injury and subsequent removal from sport can be a negative experience initiating mental health issues (Putukian, 2016).

Professional mental health help-seeking post-injury and following threats to a player's athletic identity is important. Previous research has acknowledged that elite Irish athletes report a personal willingness to seek sport psychology consulting when dealing with injury/rehabilitation (Woods et al., 2015), are open to sport psychology consultation and have positive attitudes to service use (Lavallee et al., 2005). However, elite athletes (Gorczynski et al., 2019) and young Irish people (Chambers et al., 2015) often do not seek professional psychological help, with injury contributing to the onset of mental health issues and not seeking help (Wood et al., 2017; Gulliver et al., 2015). In particular, there is poor accessibility to sport psychology consulting within elite Irish athletes' support networks (Woods et al., 2015).

Informal supports, particularly from family and friends, are preferred among Irish student-athletes when seeking help for mental health issues (Drew and Matthews, 2019), as family and friends provide emotional and practical support for injured athletes (Yang et al., 2010; Johnston and Carroll, 1998). The preference for informal help may be due to the personal and non-professional relationship evident (Rickwood and Thomas, 2012), the lack of awareness of professional services (Gulliver et al., 2012a) and the absence of associated access barriers (e.g., cost, time, transport) (Lopez and Levy, 2013; Gulliver et al., 2012a) that may be evident when accessing formal services. However, informal supports may be untrained, inexperienced and liable to make a mistake (Hughes et al., 2018) and may lack the knowledge and appropriate awareness in providing helpful responses for difficult issues (Rickwood et al., 2005).

Encouraging players to seek appropriate psychological help is an essential preventative and treatment strategy when managing mental health (Gulliver et al., 2012a) and the use of professional help-seeking supports who can provide evidence-based treatments (Deane et al., 2001) is appropriate in the management of mental health issues following injury. The prevalence of injury among Gaelic footballers (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; Murphy et al., 2012; Newell et al., 2006; Cromwell et al., 2000) and the associated increased risk of experiencing mental health issues post-injury (Gouttebarge et al., 2016), highlights the need for a greater understanding of the barriers and facilitators to professional mental health help-seeking post-injury perceived by Irish Gaelic footballers. A wealth of barriers to mental health help-seeking have been identified in elite and collegiate athletes, including public, perceived and self-stigmatising attitudes (Wood et al., 2017; Moore, 2017; Lopez and Levy, 2013; Gulliver et al., 2012a), lack of MHL (Wood et al., 2017; Moore, 2017; Gulliver et al., 2012a), negative past experiences (Moreland et al., 2018; Gulliver et al., 2012a), lifestyle factors (e.g., time, cost, access) (Lopez and Levy, 2013; Gulliver et al., 2012a) and personal characteristics of the help-seeker (e.g., age, gender) (Moreland et al., 2018; Gulliver et al., 2012a). In collegiate athletes, further motives to avoiding help-seeking include uncertainty about confidentiality (Moore, 2017), belief that help is not necessary or hesitation about interacting with a professional (Bird et al., 2020), shame (Wood et al., 2017), perceptions that the provider does not understand the demands on the athlete and fears seeking services will negatively impact sports performance (Moore, 2017).

Mental toughness may be an additional barrier to help-seeking, with the broader culture of sport assuming mental toughness of sports participants (Pike, 2018), suggesting athletes are capable of dealing with pressures and expectations (Bauman, 2016). However, mental toughness does not equate to mental health and seeking help when experiencing a mental health issue may be perceived to undermine athletic identity and mental toughness (Pike, 2018). The highly physical nature of Gaelic football may add to players' perceptions that they must adhere to this mental toughness ideology and that seeking help is the antithesis of the strength that athletes should portray (Pike, 2018).

There are also a number of facilitators that can promote mental health help-seeking, with social support, previous positive experiences with a health care provider, access to online services and emotional competence reported among young elite athletes (Gulliver et al., 2012a). Factors promoting positive attitudes and willingness to seek and utilise mental health services are considered facilitators among collegiate athletes (Moreland et al., 2018). Approaches to promote help-seeking must be informed by a clear understanding of barriers that inhibit mental health help-seeking (Gulliver et al., 2012a) that are specific to the athletic population. However, there is currently no available research examining the barriers or facilitators to mental health help-seeking following injury in an Irish athletic population, particularly in Gaelic footballers, despite the fact that Gaelic football is the most popular field-based team sport in Ireland at present (Sport Ireland, 2019).

Mental health research should also aim to explore the subjective experiences of those within sport (Doherty et al., 2016) and the imperative differences in those experiences between males and females. Previous research has shown differences in athlete coping responses between genders following injury (Kontos et al., 2013), with female athletes significantly more likely to seek help than male athletes (Barnard, 2016). Mental toughness may also be heightened through a gendered lens (Pike, 2018) and the perception of masculinity (Moreland et al., 2018), where men are assumed to have no weaknesses, increasing reluctance to seek professional help when experiencing mental health issues. These gender differences are evident in post-injury responses and help-seeking practices and therefore, a greater understanding is required of the differences in perceived barriers and facilitators to help-seeking between male and female elite and sub-elite Gaelic footballers. Therefore, the aim of this research was to examine the perceived

barriers and facilitators to help-seeking following injury in male and female elite and sub-elite Gaelic footballers.

6.3 Methodology

6.3.1. Design

In the examination of the barriers and facilitators to mental health help-seeking post-injury, constructivist grounded theory was deemed an appropriate methodological choice. Grounded theory methodology allows the investigation of how and why persons, organisations or communities experience and respond to events, challenges and problematic situations (Holt, 2016) and elicits rich narrative personal accounts of the experience to generate an inductive theory (Gill, 2020). A constructivist approach assumes an individual actively constructs the realities in which they participate (Charmaz, 2006) and allows researchers to co-construct experience and meaning with participants (Charmaz and Bryant, 2011). Grounded theory is an iterative process that involves repeated cycles of simultaneous data collection and analysis, with purposive and theoretical sampling, to allow continuous refinement, expansion and challenging of the emerging theory (Kennedy and Lingard, 2006). Grounded theory methodology can advance the literature by offering new theoretical insights and explanations (Kendellen and Camiré, 2019) and was appropriate in the current study as a sport-specific theory addressing the factors inhibiting and facilitating help-seeking is yet to be developed. Ethical approval was granted by the Institutional Research Ethics Committee (#20180201). Participants received a participant information sheet and provided informed consent (Appendix Y) prior to data collection.

6.3.2. Participants

Participants were initially recruited using purposive sampling, with the requirement of being a current adult Gaelic footballer with a history of injury in the previous three years. Recruitment was conducted via social media [Twitter (@GFIP_Study), Facebook (@GFIPStudy)] and word of mouth. As the theory began to emerge, participants were selected using theoretical sampling to ensure the data was driven by the evolving theoretical concepts and to allow for the identification of patterns and variations in the data (Corbin and Strauss, 2008). Theoretical sampling ensued until data saturation was met, which was determined as the point when no new categories or themes emerged within the analysis of the data (Charmaz, 2014).

The final sample (N=53) comprised of elite male (N=14; 20.6±3.1 years) and female (N=12; 23.5±2.8 years) and sub-elite male (N=14; 23.3±4.4 years) and female Gaelic footballers (N=13; 22.5±5.0 years). Participants were required to have a history of moderate or severe injury to ensure all players had a shared understanding of an injury experience. Injury severity was defined according to the number of days missed from Gaelic football participation due to injury; moderate (7-21 days) or severe (>21 days) (O'Connor et al., 2016a). Injuries were limited to the previous three years to reduce the effects of recall issues, while still accounting for injuries of greater severity that resulted in a significant amount of time loss and that may elicit prolonged psychological consequences.

6.3.3. Pilot Study

To educate and train the primary researcher in efficient focus group techniques and the use of an analytical framework when analysing the data, a pilot study was conducted. Fifteen collegiate athletes [male (N=6) and female (N=9); 24.4±4.5 years] were recruited as a convenient sample. Members of pilot focus groups were sport participants for 10.5±6.1 years and were active participants in various sports, including camogie (N=6), rugby (N=3), recreational gym (N=4) and athletics (N=2). Participants had a history of moderate (N=5) or severe (N=10) injury in the previous three years. Three focus groups were conducted, facilitated by the primary researcher, each taking place in a meeting room in Athlone Institute of Technology and lasted 50.7±7.4 minutes. The procedures followed in the pilot study were similar to the procedures in the main study, which are detailed below.

6.3.4. Procedures

Focus groups (range: 3-7 participants) were moderated by the primary author, lasted 46.5±8.7 minutes and were audiotaped and video recorded in a location convenient to participants. Demographic information (age, gender, years playing Gaelic football and history of injury) was captured upon arrival and each participant was issued a name tag to facilitate group discussion. Each focus group began with instructions on appropriate focus group conduct and highlighted the confidential and voluntary nature of the discussion (Appendix Z). To ensure all participants had a clear understanding of mental health issues, definitions of key terms and a case vignette, which provided an example of a Gaelic footballer's experience of mental health issues following injury, were presented (Table 6.1).

Focus group procedures were designed to follow as closely as possible the methods utilised by Gulliver et al. (2012a). The identification of barriers to help-seeking was initiated with a written task, where participants noted three things that might stop them from seeking help when experiencing a negative psychological reaction to injury. Group discussion began by participants introducing a barrier they perceived to reduce help-seeking among Gaelic footballers post-injury. Participants were encouraged to discuss barriers introduced, with each participant given the opportunity to introduce personal perceived barriers. Additional barrier topics identified in previous literature were then presented by the primary author to the group for discussion. The group were given an opportunity to present any additional barriers not discussed. Participants were encouraged to introduce perceived barriers to help-seeking to the group so discussion could ensue with little input from the moderator. Following discussion, the barriers ranking task was completed (Appendix AA). The written task, group discussion and ranking task (Appendix AA) were repeated in the examination of help-seeking facilitators post-injury. At the end of the group discussion, participants were reminded help is available when experiencing mental health issues and to contact their GP if necessary.

Table 6.1 Case vignette and definitions presented during focus group

Case Vignette (Adapted from Cormier and Zizzi, 2015)	
Toby is a starting senior Gaelic football player and top scorer of a Division 1 team. After jumping up to catch a ball during a challenge match, Toby landed awkwardly and suffered a serious ankle sprain on his dominant foot. After his initial evaluation, the doctors, as well as the head athletic therapist, informed Toby that he would likely be side-lined for at least 5-6 weeks but would not require surgical repair to his ankle. Since playing underage football, you have known Toby to be an outgoing, cheerful, and upbeat person. However, since hearing his prognosis, Toby appears discouraged, because he trained hard through winter to become season ready. For the first few weeks following his injury diagnosis, you notice that Toby is often 5-10 minutes late to rehab appointments, rarely engages in small talk and generally seems sad. He still completes all his exercises and stretches as instructed by the athletic therapist but is visibly frustrated with his rehabilitation timeline and lack of progress early on. You've also noticed that, even though he attends team trainings, he normally stands on the side-line and doesn't say much.	
Definitions (Gulliver et al., 2012a)	
Seeking help	Looking for help from a professional source (e.g., a doctor, counsellor or a psychologist)
Barriers	Factors that can make it harder or stop you from getting help
Facilitators	Factors that can make it easier for you to seek help

6.3.5. Data Analysis

Audiotaped focus groups were transcribed verbatim by the primary author, with video recordings utilised to confirm the identity of each speaker. Participants were assigned identification numbers during transcription to maintain anonymity and protect confidentiality and responses were coded by gender and playing level (M-E= elite male; F-E= elite female; M-SE= sub-elite male; F-SE= sub-elite female). The transcribed focus groups were coded by the principal researcher in NVivo12 (QSR International, Melbourne, Australia). Constant comparative analysis was conducted, which began following completion of the initial focus group and theoretical sampling ensued until data saturation was met. Core categories were identified, with emergent themes and sub-themes evident in each category. The core categories are presented in order of those most to least commonly discussed. In addition, the written tasks were thematically classified and visually represented according to the prevalence of each theme. The barrier and facilitator ranking tasks were reverse scored, where 1= 3 points, 2= 2 points and 3= 1 point, and summed with a higher score indicating a higher ranked barrier or facilitator, as utilised by Gulliver et al. (2012a). The Standards for Reporting Qualitative Research (SRQR) were adhered to (O'Brien et al., 2014) (Appendix AB).

6.3.6. Trustworthiness

Similar to investigator triangulation methods utilised by Woods et al. (2015), a coding consistency check was conducted by two of the researchers on the categories, themes and sub-themes identified, in efforts to increase credibility and ensure consistency and agreement in the coding of transcribed focus groups. Disagreements during the analysis were discussed within the group to achieve consensus. In addition, method triangulation was conducted in the collection of data through both group discussion and written barrier and facilitator tasks. Furthermore, in the presentation of results, multiple examples from the transcripts are provided, which outlines the fit between the data and the analytical coding framework. The current findings also indicate multi-vocality, highlighting diverse contribution from participants during focus groups. This use of multiple sources of data, investigators and theoretical viewpoints is suggested as a method of triangulation in order to reduce the chance of individual bias (Tracy, 2010; Biddle et al., 2001).

6.4 Results

6.4.1. Pilot study

A short summary of the barriers and facilitators to help-seeking identified in the pilot study are provided, as the aim was to educate and provide training for the primary researcher in efficient focus group techniques, while also examining the usefulness of the analytical framework in coding the transcribed data. The analytical coding framework was deemed an efficient measure and appropriate for coding participant responses based on this pilot study.

6.4.1.1. Barriers to help-seeking

Poor awareness of services was the most commonly identified barrier in the initial written task in the pilot study, followed by stigma and feeling professional help is not necessary (Figure 6.1). Group discussions among pilot study participants acknowledged lack of education (absence of knowledge of help-seeking services and symptoms of mental health issues), accessibility issues (lack of services locally), negative attitudes to seeking help (feeling embarrassed, believing it is better to manage psychological distress on your own and unwillingness to express emotion or discuss problems) and the perception of others (stigma from teammates or coaches) as barriers to help-seeking. Lack of knowledge of mental disorders and their symptoms emerged as the most prominent barrier in the ranking task in the pilot study (Table 6.2).

6.4.1.2. Facilitators of help-seeking

The most common factors to aid help-seeking reported by pilot study participants were social support, normalising help-seeking and awareness of services (Figure 6.2). Facilitators identified in group discussions with pilot study participants included the attitudes and actions of others (social support and normalising help-seeking), education (awareness of services and symptoms of mental health issues) and accessibility (access to online resources and convenient access to a known professional). Being aware of your feelings and finding it easy to express them was acknowledged as the highest ranked facilitator in the pilot study (Table 6.2).

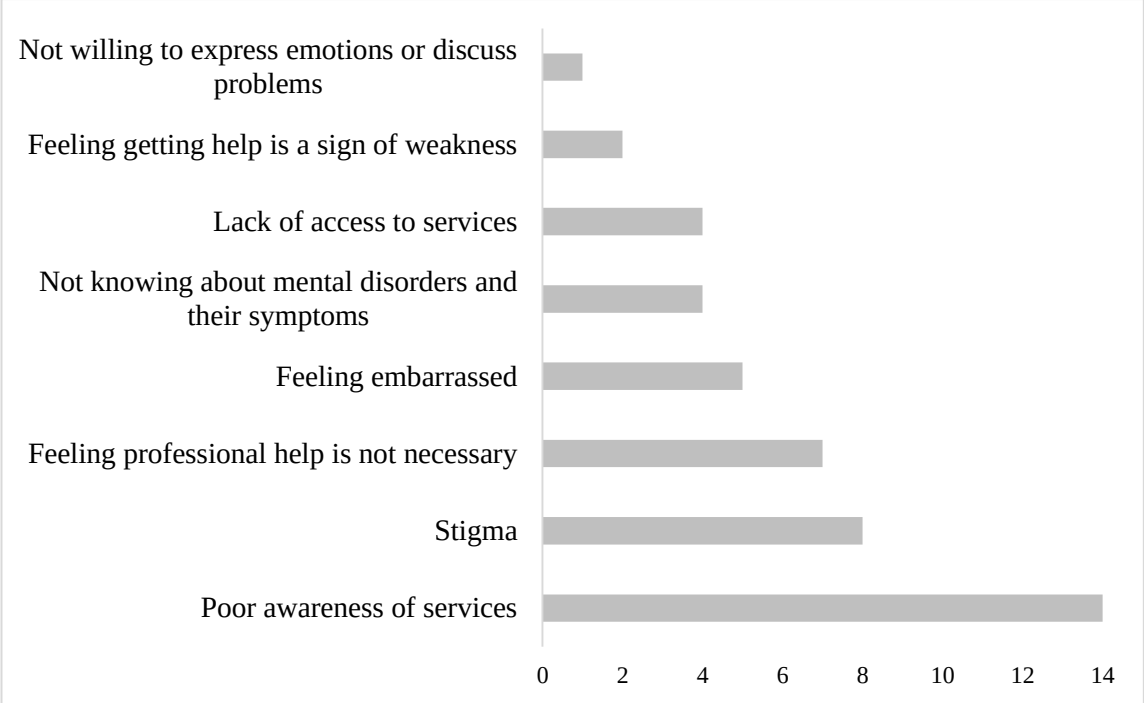


Figure 6.1 Barriers to help-seeking among pilot study participants identified in the written task

Table 6.2 Top ranked barriers and facilitators in the pilot study

	Score*
Barriers	
Not knowing about mental disorders and their symptoms	23
How you feel about yourself seeking help	18
Worried what others will think	16
Not knowing when to seek help	12
Cost of services	7
Facilitators	
Being aware of your feelings and finding it easy to express them	34
All athletes required to see a counsellor/psychologist as part preparation/training	26
Coach has a positive attitude to seeking help	10

Note: *Score calculated by reverse scoring ranked activity (i.e., 3=1, 2=2, 3=1) and summed across participants. Higher score indicates higher ranked barrier.

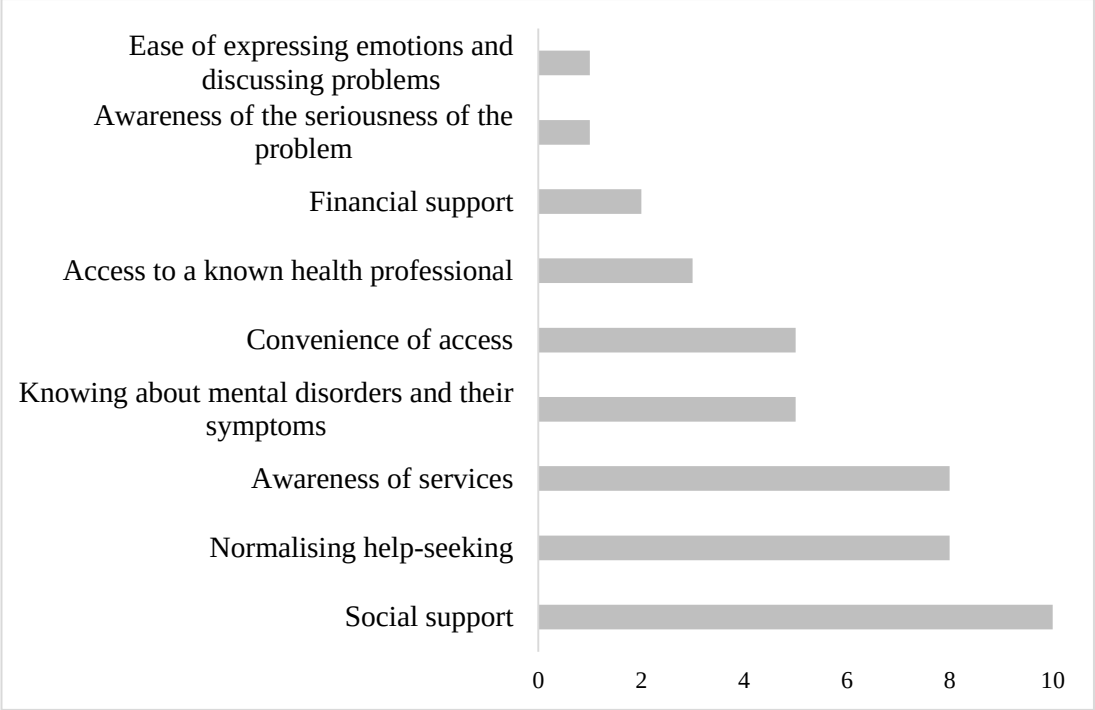


Figure 6.2 Facilitators to help-seeking among pilot study participants identified in the written task

6.4.2. Main study

Twelve focus groups were conducted with male (N=3) and female (N=3) elite and male (N=3) and female (N=3) sub-elite Gaelic footballers. Participant demographic information is evident in Table 6.3. The findings indicate that mental health help-seeking among elite and sub-elite Gaelic footballers is facilitated by several factors but similarly, may be inhibited by a number of barriers. Figure 6.3 depicts a schematic representation of the emerging barriers and facilitators impacting help-seeking among Gaelic footballers and illustrates their interrelationships in the form of a grounded theory model. A comprehensive representation of the identified barriers and facilitators are evident below in sections 6.4.2.1. and 6.4.2.2.

Table 6.3 Participant demographic information

	Male Elite (N=14)	Female Elite (N=12)	Male Sub-Elite (N=14)	Female Sub-Elite (N=13)
Age [years (SD)]	20.6 (3.1)	23.5 (2.8)	23.3 (4.4)	22.5 (5.0)
Gaelic football experience [years (SD)]	13.6 (4.1)	15.4 (3.7)	16.1 (4.0)	13.3 (4.6)
History of moderate injury (N)	5	5	4	4
History of severe injury (N)	9	7	10	9

Note: N=number of participants; SD=standard deviation

6.4.2.1. Barriers to help-seeking in elite and sub-elite Gaelic footballers

The initial written task in the main study identified stigma, feeling professional help is not necessary and poor awareness of services as common barriers to help-seeking among participants (Figure 6.4). Stigma (worried about what others will think) and lack of education (not knowing when, how or where to seek help) were the highest ranked barriers identified among male and female elite and sub-elite Gaelic footballers in the ranking task (Table 6.4). Lack of education, the perception of others, negative attitudes to seeking help and accessibility issues were identified as core categories in the group discussion of barriers in elite (Table 6.5) and sub-elite Gaelic footballers (Table 6.6).

Gender and playing level differences were also evident (Table 6.5; Table 6.6). Characteristics of the help provider was an additional barrier category noted by sub-elite Gaelic footballers (Table 6.6). In terms of the differences in themes and sub-themes identified within each category, not knowing what to expect in a consultation was uniquely acknowledged by elite female and sub-elite male Gaelic footballers (Table 6.5; Table 6.6). Lack of knowledge of how to seek help was identified solely by sub-elite female Gaelic footballers (Table 6.6). Lack of knowledge of the benefits or importance of seeking help and feeling it is better to manage on your own were discussed by male and female elite Gaelic footballers but were solely acknowledged by male sub-elite players (Table 6.5; Table 6.6). Stigma from friends and family and lack of time to access services were uniquely identified as barriers in elite female players (Table 6.5). Feeling embarrassed was a barrier primarily acknowledged in female elite and sub-elite Gaelic footballers (Table 6.5; Table 6.6).

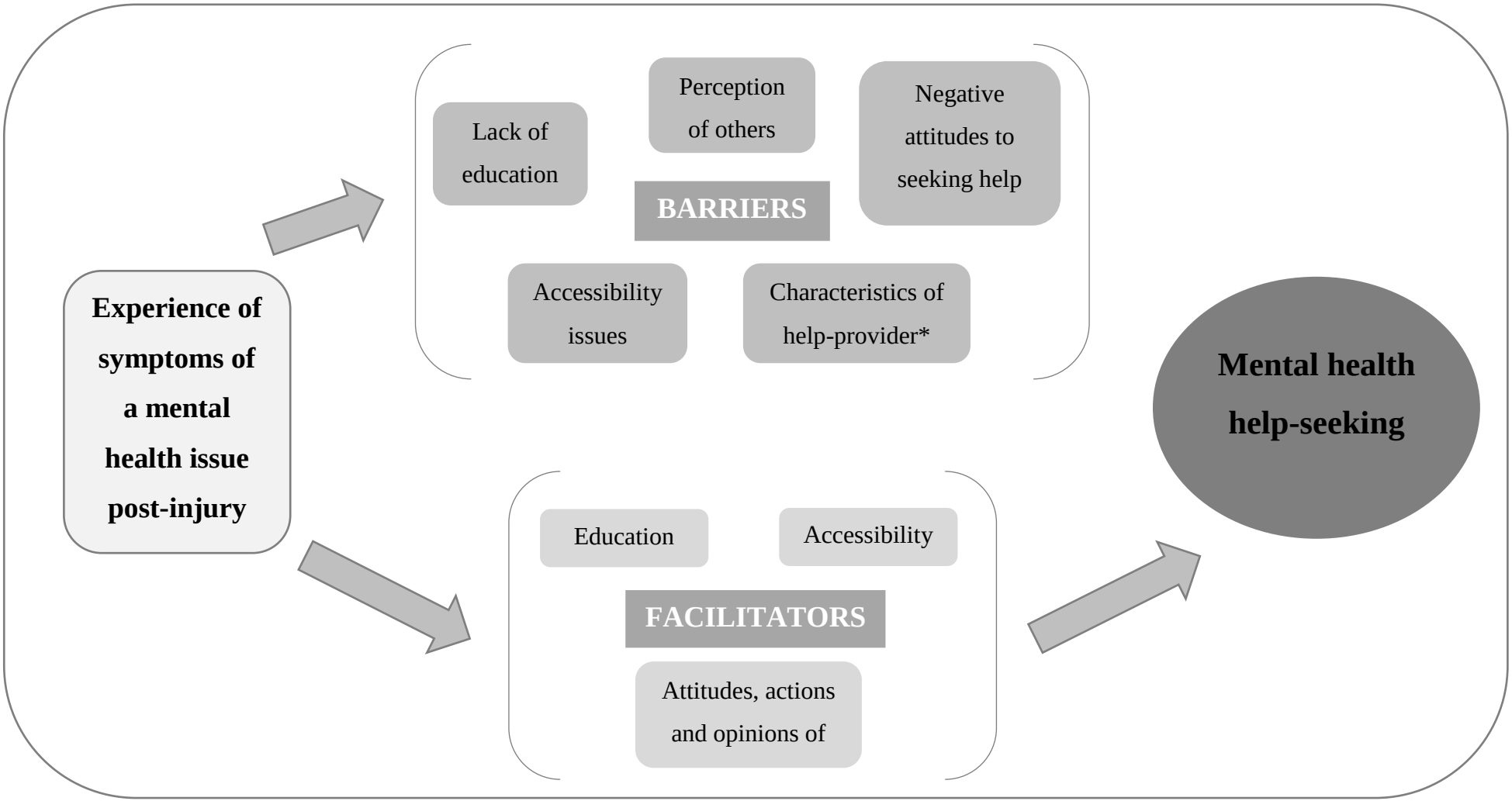


Figure 6.3 A grounded theory of factors inhibiting and facilitating mental health help-seeking post-injury

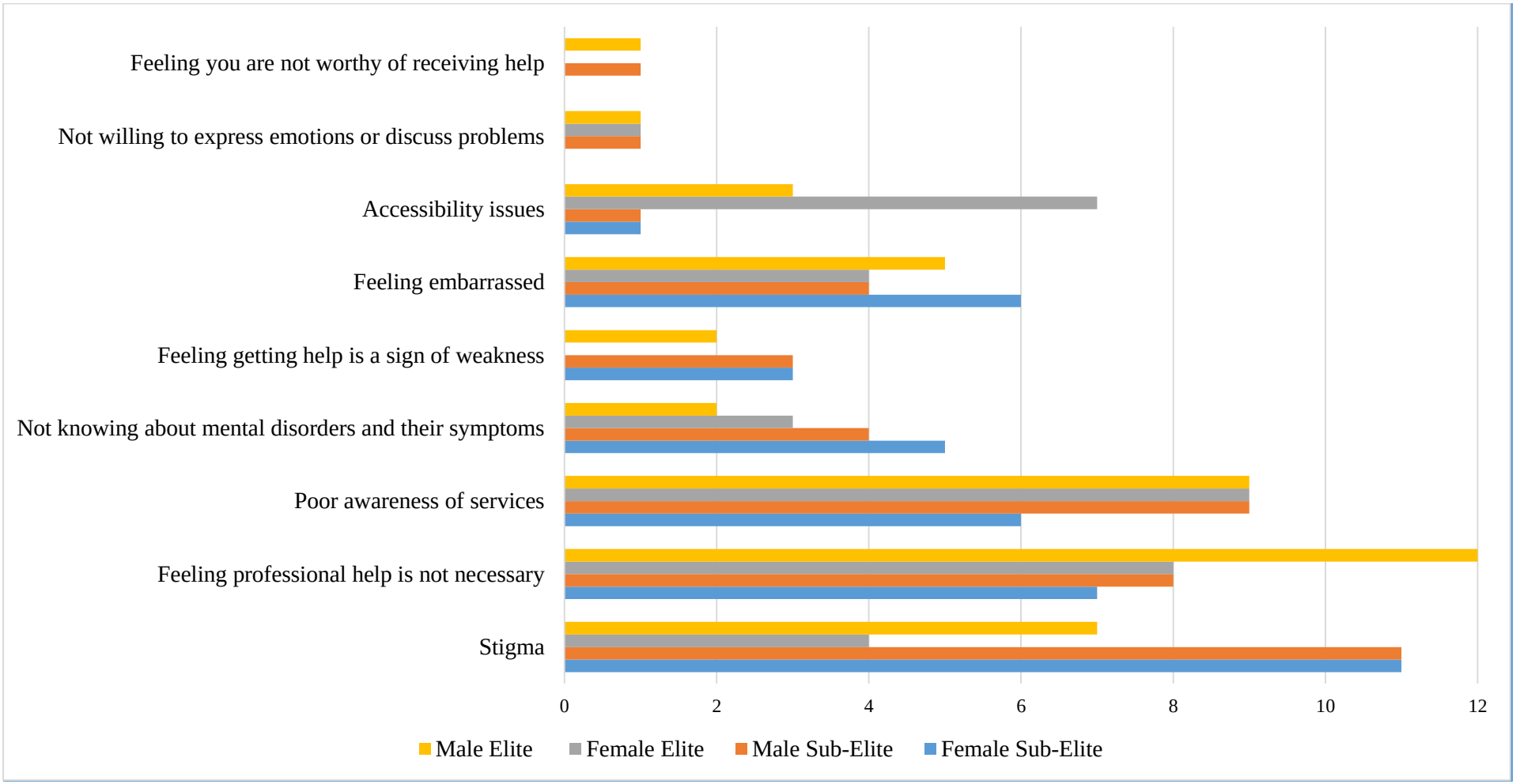


Figure 6.4 Barriers to help-seeking among elite and sub-elite Gaelic footballers identified in the initial written task

Table 6.4 Top ranked help-seeking barriers and facilitators in elite and sub-elite Gaelic footballers

	Elite		Sub-Elite	
	Male	**Female**	**Male**	**Female**
	N=14	**N=12**	**N=14**	**N=13**
	Score*			
Barriers				
Worried about what others will think	20	11	24	14
Not knowing when to seek help	15	-	-	19
Not knowing how or where to seek help	-	10	20	19
How you feel about yourself seeking help	-	12	-	-
Not knowing about mental disorders or what the symptoms are	10	-	-	-
Facilitators				
Being aware of your feelings and finding it easy to express them	13	-	11	22
Teammates have a positive attitude to seeking help	13	9	-	16
Coach has a positive attitude to seeking help	12	-	13	12
All athletes are required to see a counsellor or psychologist as part of their preparation and training	-	16	17	-

Note: *Score calculated by reverse scoring ranked activity (i.e., 3=1, 2=2, 3=1) and summed across participants. Higher score indicates higher ranked barrier or facilitator.

Table 6.5 Core categories, themes and sub-themes acknowledged by elite male and female Gaelic footballers during group discussions

Core categories	Themes	Sub-themes
Barriers		
Lack of education	Poor awareness of services	Not knowing where to seek help Not knowing the benefits or importance of seeking help Not knowing what to expect in a professional consultation[2]
	Not knowing about mental disorders and their symptoms	
Perception of others	Stigma	From teammates From coach and management From friends and family[2]
Negative attitudes to seeking help	Feeling professional help is not necessary Feeling it is better to manage on your own Feeling embarrassed[2]	
Accessibility issues	Cost of services Lack of time[2]	
Facilitators		
Education	Awareness of services	Knowing what to expect in a professional consultation Knowing the benefits and importance of seeking help[1] Knowing when to seek help Knowing where to seek help
	Knowledge of mental disorders and their symptoms	
	Awareness of others who have experienced mental health issues	
Attitudes, actions and opinions of others	Social support	From coach and management From teammates From friends and family
	Normalising help-seeking	
Accessibility	Financial support Convenience of access Access to online resources[2]	

Note: Core categories are presented in order of those most to least discussed; [1]only discussed by male participants; [2]only discussed by female participants

Table 6.6 Core categories, themes and sub-themes acknowledged by sub-elite male and female Gaelic footballers during group discussions

Core categories	Themes	Sub-themes
Barriers		
Lack of education	Poor awareness of services	Not knowing where to seek help
		Not knowing the benefits or importance of seeking help[1]
		Not knowing what to expect in a professional consultation[1]
		Not knowing how to seek help[2]
	Not knowing about mental disorders and their symptoms	
Perception of others	Stigma	From teammates
		From coach and management
Negative attitudes to seeking help	Feeling professional help is not necessary	
	Feeling it is better to manage on your own[1]	
	Feeling embarrassed[2]	
Accessibility issues	Cost of services	
Characteristics of help provider	Help-providers lack of experience of sport or Gaelic football	
Facilitators		
Attitudes, actions and opinions of others	Social support	From coach and management
		From teammates[2]
		From family and friends[1]
	Normalising help-seeking	
Education	Awareness of services	Knowing where to seek help
		Knowing what to expect in a professional consultation
	Knowledge of mental disorders and their symptoms	
	Awareness of others who have experienced mental health issues	
Accessibility	Financial support	
	Convenience of access	
	Access to online resources	

Note: Core categories are presented in order of those most to least discussed; [1]only discussed by male participants; [2]only discussed by female participants

6.4.2.1.1. Lack of education

6.4.2.1.1.1. Poor awareness of services

Male and female elite and sub-elite participants discussed a lack of knowledge of available services as a barrier stopping mental health help-seeking following injury – M-E1: *"there is a lack of awareness that you need help or even that there is help available"*. Elite participants agreed there is a particular lack of awareness of where to seek professional psychological help and acknowledged that players often would not know where to start when help is needed.

> M-E1: *"if you tear your ACL, there's a scan that shows your ACL is torn and this is how you fix it. There isn't so much a scan for the psychological effects and this is something you do to fix it. I suppose you are kind of in the dark as to where to even start when you need that help".*

Lack of awareness of where to seek help was echoed by sub-elite players – M-SE1: "*I would have no idea about who I contact in my area. Do I go through the club, do I go through it privately? Are there specific people relative to sport or do I go to a general one?*".

A lack of knowledge of the benefit or importance of psychological help was also recognised as a barrier to help-seeking in male and female elite Gaelic footballers. Participants noted the focus when injured is placed on physical recovery and often players may lack the awareness of the benefit of seeking help in the recovery process.

> F-E2: *"when I was coming back from injury I didn't even think of going to someone, it didn't even cross my mind. I suppose it was the fact that I actually just didn't realise the importance of doing that psychological rehab. Not the same way I would have looked at the physical stuff".*

In addition, sub-elite male Gaelic footballers reported a lack of knowledge of the benefit or importance of seeking psychological help as a key barrier.

> M-SE1: "*I think even if you see what some clubs have these days in terms of my club at home, there's access to strength and conditioning, there's access to a couple of coaches, there's video analysis. I know some clubs around the country have GPS and technology like that so I think in some places anyway, there is provisions there but it's just not something that's considered important enough I imagine*".

Elite female and sub-elite male participants also regarded the lack of awareness of what to expect in an appointment or consultation with a professional as a barrier to seeking help – M-SE2: "*you don't really think if there is something wrong, what happens next. The whole process is never really explained so I suppose it's probably daunting enough"*. Not knowing how to seek help was acknowledged as an additional barrier among female sub-elite players – F-SE1: "*you don't know how to go about seeking help. I know from a club perspective, there wouldn't be. It's not outlined at the start of the year if you have an injury there is a psychologist there to help*".

6.4.2.1.1.2. Not knowing about mental disorders and their symptoms

A theme emerging among group discussions was the lack of knowledge of mental disorders and their symptoms. Elite and sub-elite players discussed a lack of knowledge to realise there is something wrong and uncertainties of what signs and symptoms to identify.

> F-E2: *"I was just in bed loads, not doing my rehab and I just had minus interest in hanging out with anyone, seeing anyone, speaking to anyone…I kind of thought it was a bit of guilt but when I realised afterwards that I was in a bit of a hole there for a while but like it is hard to realise at the time. You don't really know what the symptoms of psychological problems even are so it's hard to go ask for help when you don't even really realise it".*

Participants also noted that some Gaelic footballers may associate their symptoms as normal feelings associated with being injured.

> M-SE3:*"you are kind of like I'm feeling bad now but the reason I'm feeling bad is because I'm not playing so when I go back playing, everything will sort itself out but that's not always the case because if you're down with a serious injury or something like that, it doesn't just get better overnight. It takes time to get better".*

Participants also suggested that not knowing they are suffering psychologically may be due to the reliance on physical rehabilitation.

> F-E4: *"you're so caught up with physically recovering but then like when you look back, it affects sleep, as you were saying about being anxious, there is so much but I don't know are you just so caught up with the physical side of it that the player themselves don't realise".*

Players acknowledged that despite increased recognition of mental health, players may still lack the understanding of mental disorders.

> F-E5: *"it's all over social media as well now, depression and mental health and well-being but what actually is it? How do you know you have it and then how do you know you have something mild or something severe? How do you know if you need a lot of help or a small bit of help?".*

6.4.2.1.2. Perception of others

6.4.2.1.2.1. Stigma

Male and female elite and sub-elite participants discussed stigma and the negative perception of others as a help-seeking barrier – F-SE3: "*players may not want people to think they are going to get help. They might think they would view them differently or something if they need help*". Participants acknowledged the stigma may be due to the fact that help-seeking is not accepted as a normal aspect of injury rehabilitation and the belief that others would judge them by making comparisons to other players.

> F-E1: *"scared of what others think, like everyone goes through this so say two players done their cruciate, one goes seeking help and the other doesn't like what is wrong with this one. It's just basically what others are thinking more than anything else".*

Participants made particular reference to the opinion of the coach/management– M-E3: *"I would think that probably coaches wouldn't have the same acceptance to it as a physical injury. They wouldn't see that or be aware of those signs among players".* Female players referred to the perceptions of male management, the fear of judgment and losing their position on the team – F-E5: *"men kind of leave emotion out of a lot of things so it's kind of harder for them to understand how you are feeling and can judge you then".* In addition, the perception of teammates was deemed important.

> F-SE4: "*your teammates are the ones you are involved with the most, you need to have that bond with them to be able to go out and play so you don't want them judging you or thinking badly of you for getting help*".

Elite female participants also noted negative perceptions from their family may limit their help-seeking.

F-E7: *"I think I would be worried about my family as well. They would be like you are doing this part-time, why are you so worried about it. Stop playing, give it up, it's affecting you too much. They don't get it".*

6.4.2.1.3. Negative attitudes to seeking help

6.4.2.1.3.1. Feeling professional help is not necessary

Feeling that professional help is not necessary was recognised as a barrier to help-seeking in male and female elite and recreational Gaelic footballers. Participants acknowledged a denial of the seriousness of the problem and reported the view that professional help is not needed as a normal way of dealing with injury.

F-E8: *"you are kind of like it's a mental battle between yourself, you have to get over it yourself. You think that you don't need that psychological help I suppose. It's kind of denial of that need for help I think sometimes as well".*

Denial of a need for help was suggested to be attributed to the belief that upon returning to play, the negative responses will disappear – F-SE7: "*players don't usually manage these feelings when they have them. They just think when you're back then you'll be fine, it will all be sorted out. Everything will be solved then*". Participants acknowledged that feeling professional help is not necessary may be a societal issue – F-E5: *"it's an Irish problem, we always say we're grand, we're fine".* In addition, male players noted the perception that help is not necessary may stem from gender stereotypes – M-E5: *"it's like I shouldn't need that, there's no need for that sort of stuff because I'm a lad".*

6.4.2.1.3.2. Feeling it is better to manage on your own

Male and female elite participants acknowledged the perception that it is better to manage mental health issues on your own as a barrier to seeking help – F-E7: *"you kind of just cut yourself off from everyone, nothing matters anymore and you think you can just handle it all on your own".* In addition, elite players discussed the belief that issues may sort themselves out – F-E1: *"I think as well you might not get help because you think it will pass over time. You think oh I won't feel like this forever or it will be grand".* Elite participants also discussed the belief that upon returning to play following injury, mental health issues will resolve.

M-E1: "*I'd say, just in my own experience of being injured, you might get some of those feelings, you generally put it down to not having the opportunity to physically release so in my head I would be saying well as soon as I get a chance to do some form of exercise that will relieve it".*

The perception that it is better to manage on your own was also commonly discussed by sub-elite male Gaelic footballers – M-SE7: "*I think players might feel they are able to deal with whatever is going around in their head themselves, they won't need any help*". Male sub-elite players also acknowledged the perception that the severity of their symptoms does not justify professional help.

> M-SE1: "*you might feel like it's very situational and that like oh I'm sad because of football, there's people who feel a lot worse than me for a lot more important reasons. I'm not going to go take up somebodies time for feeling bad about not being able to play football when there are more important things in the world*".

6.4.2.1.3.3. Feeling embarrassed

Elite and sub-elite female participants acknowledged feelings of embarrassment as a barrier to help-seeking – F-SE8: "*I would just feel like I am letting myself down, I feel I would embarrass myself*". In addition, those elite female players who reported having access to a psychologist within the team setting acknowledged that embarrassment may still be a limiting factor – F-E8: "*like the opportunity might be there but a lot of girls still might feel embarrassed to talk about it".* Embarrassment was particularly noted when needing to disclose how you are feeling to management.

> F-E8: *"Being embarrassed to talk about it. A lot of people feel embarrassed to talk, even myself like before we had the psychologist with the county team to talk to last year, I definitely know myself that I wouldn't have gone to management or anything like that".*

6.4.2.1.4. Accessibility issues

There was agreement among elite and sub-elite focus group participants that a lack of access to services was a barrier to help-seeking, in particular, the cost of services – M-E7: *"money as well I suppose. Obviously if they can't afford it like they aren't going to get it. They might be afraid to tell someone then because they won't have the support".* Participants stated that players may not have the necessary funds themselves to cover the cost of professional psychological help, particularly as a student.

> F-E5: "*the expense, being in college, it's probably the last thing you are going to think of as well forking out whatever it is, maybe €50 to go to a psychologist for an hour. I would probably put my mind on getting recovered, I would completely forget about looking after the mental side of things"*.

Players noted that despite the support of the injury fund, cost remains a barrier as claiming this money can be an issue – F-E9: *"even the injury fund, it's such a rigmarole to actually get the money. So if you have to go through all that on top of it, you're probably not going to bother".* Sub-elite players acknowledged clubs often do not have access to professional mental health services, which allows for access issues – M-SE6: "*most clubs don't really have an expert on psychology available so if they don't have it, you have to go somewhere else for it. Its time and money as well which most players don't have*".

The lack of time to access help-seeking services was identified as an additional access barrier among elite female players – F-E10: *"you have an injury but then we work every day and that's another thing, you put it to the back of your head because it's like do I really even have time for that".* Elite female participants stated that often physical recovery can take precedent.

> F-E10: *"you would probably prioritise the whole physical side of it, you would be like right I have to rehab. If there is something that has to give here, I only have time for one of those things, it's going to be getting that injury physically ready".*

6.4.2.1.5. Characteristics of help provider

6.4.2.1.5.1. Help-providers lack of experience of sport or Gaelic football

Male and female sub-elite Gaelic footballers reported a professional's lack of experience of sport or Gaelic football as a barrier to seeking help.

> M-SE1: "*I would personally like someone that has at least some sort of working knowledge of the sport because it's all well and good, they obviously know about the psychology but I would feel if they didn't know enough about the sport I'm trying to get across in I wouldn't listen to their opinions as much because they are not informed*".

Sub-elite participants noted the lack of experience may make it difficult to communicate with the professional.

> F-SE1: "*you would have to have something in common with them when you're going to them because it's hard enough to open up to someone if they don't understand, you probably feel like you're not getting anywhere. You're less reluctant to go back or even tell someone else that you know is feeling the same way*".

In addition, sub-elite players acknowledged the professional may lack the understanding of the demands on a Gaelic footballer – F-SE5: "*they might just not understand the demands of sport and the pressures you are under so that would definitely stop me going to them*".

6.4.2.2. Facilitators of help-seeking in elite Gaelic footballers

Awareness of services and social support were acknowledged as important help-seeking facilitators by elite and sub-elite male and female Gaelic footballers in the initial facilitator written task in the main study (Figure 6.5). The perception of the coach and teammates, players' ability to express their feelings and seeing a mental health professional as part of their preparation and training were deemed important facilitators in the ranking task (Table 6.4). Education, the attitudes, actions and opinions of others and accessibility emerged as core categories of facilitators in the group discussions with elite (Table 6.5) and sub-elite Gaelic footballers (Table 6.6).

Despite similarities in core facilitator categories, differences were evident in themes and sub-themes between male and female elite and sub-elite Gaelic footballers (Table 6.5; Table 6.6). In the education core category, knowing when to seek help was primarily acknowledged by elite Gaelic footballers, while knowing the benefit of seeking help was a unique facilitator perceived by elite male participants (Table 6.5). The attitudes, actions and opinions of others were discussed as a facilitator by elite and sub-elite Gaelic footballers but in sub-elite players, the perception of teammates was uniquely acknowledged by females, while the perception of family and friends was only recognised as a facilitator in male participants (Table 6.6). In addition, access to online resources was acknowledged in male and female sub-elite Gaelic footballers but in elite participants, was discussed uniquely by elite players (Table 6.5; Table 6.6).

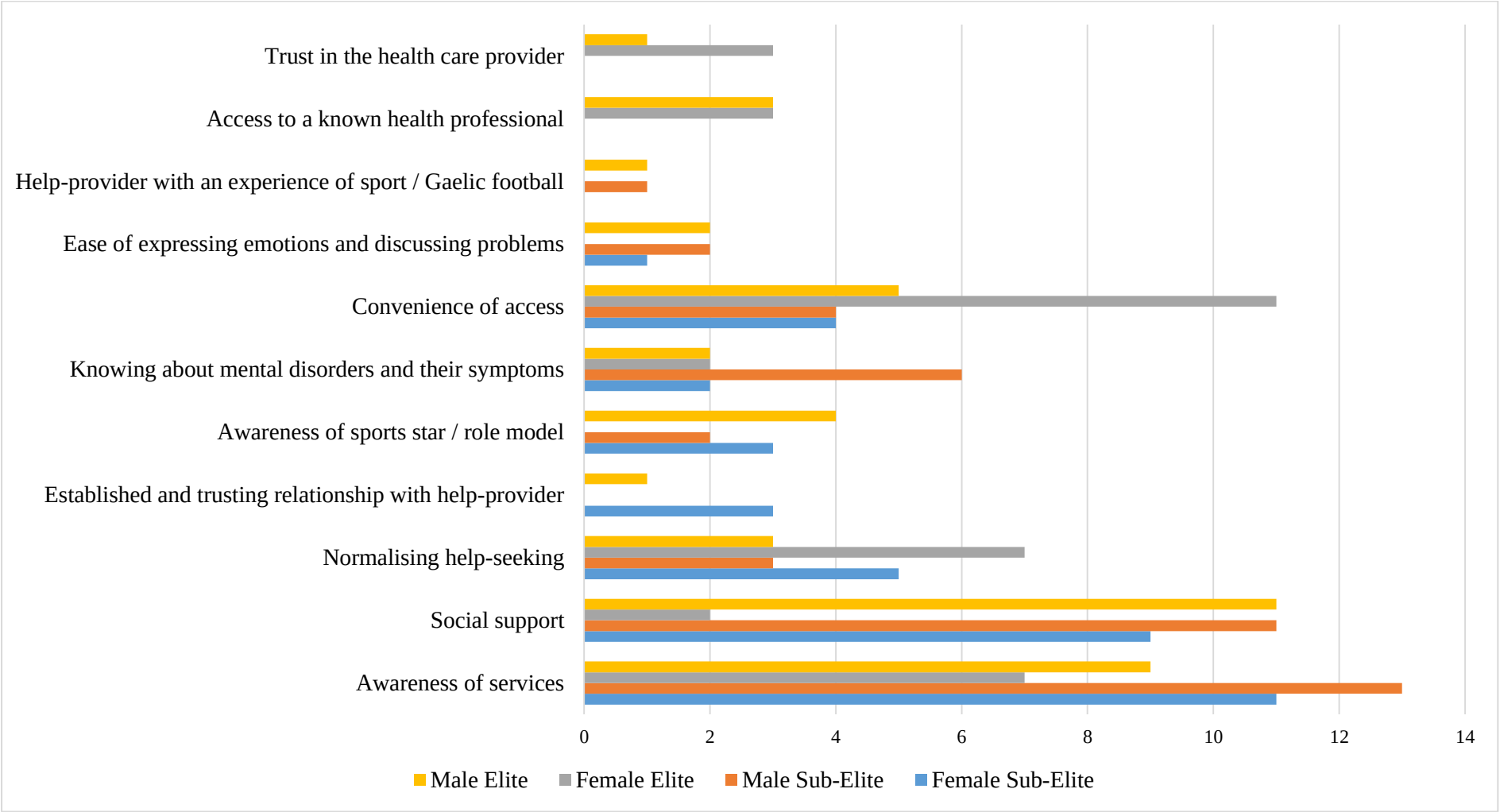


Figure 6.5 Facilitators of help-seeking among elite Gaelic footballers identified in the written task

6.4.2.2.1. Education

6.4.2.2.1.1. Awareness of services

An important facilitator theme that emerged among group discussions was the awareness of help-seeking services – M-SE5: "*if there was more awareness out there, on social media or whatever or even in teams, then people would definitely go see someone*". Among the discussion of a need for greater awareness of services, male and female elite and sub-elite participants noted knowing where to seek help was important – M-E8: *"just knowing about the services. What it is, where you can get it done. Who to go to or the person to talk to in order to book this. Just knowing more about it".* Players acknowledged if they are made aware of where to seek help, they can inform their fellow teammates – F-E11: *"I think if we done it and we went back to our clubs, we could be like look I done this, I can put you in contact with this person and it's really good for you"*. Having that resource within the team was seen to be essential – F-E5: *"it was great to have the psychologist with the team last year, I don't think anyone would have found him if he wasn't directly involved with the team"*. Male and female elite and sub-elite Gaelic footballers also noted knowing what to expect in an appointment or consultation as an important facilitator.

> M-SE1: "*you wouldn't go into a surgery or physio clinic without having them explain to you, I'm going to do this to you, like it's the exact same thing. The more knowledge you have before you go, the more comfortable you will be. The more comfortable you are, especially in a situation like this, the more likely you are going to talk*".

Knowing when to seek help was deemed important by elite male and female participants.

> F-E12: *"I think it's hard to put a time limit on when someone should go. You can't say everyone has to go three weeks after or during your rehab. I think it's just more awareness of the symptoms and that so people might be clear when they should go".*

In addition, elite male participants also discussed the awareness of the benefits and importance and importance of seeking psychological help as a facilitator.

M-E1: *"if a player thinks it will get them back on the pitch sooner, it is the first thing they will do. And what all players probably wouldn't realise how their psychological approach might get them on the pitch sooner rather than just focusing on the physical side of it".*

6.4.2.2.1.2. Knowledge of mental disorders and their symptoms

Emotional competence and awareness of mental disorders and their symptoms emerged as a facilitator among male and female elite and sub-elite Gaelic footballers – M-E4: *"maybe more awareness of what the symptoms are, what you are actually experiencing. If it's part of being injured, it's something normal or its elevated and something more serious"*. A greater awareness of signs and symptoms was deemed important so players can recognise the need for help in themselves – F-SE2: "*if you recognise the symptoms and you know that it is a psychological disorder, you know then that you would have more confidence to go and speak to somebody that you're not thinking that you are pitying yourself*". Participants noted that educating Gaelic footballers on symptoms of mental health issues at the beginning of the season may allow this awareness and facilitate help-seeking.

> F-E3: *"I think if someone was to sit down with us this year and go through kind of identify if you are struggling and then you would know then in the future, you would have the knowledge that okay hold on a minute, something is not right. So I think if we knew what to identify it would be easier then to go because you know straight away".*

6.4.2.2.1.3. Awareness of others who have experienced mental health issues

Male and female elite and sub-elite players recognised the awareness of others who have experienced mental health issues as an important facilitator. Knowing you are not alone in what you are experiencing and awareness of the positive experience of others when seeking help was acknowledged by players.

> M-E10: *"I think having someone who has experienced something similar. You know that no matter what you have someone who has experienced it and they can guide you regarding how to get back. It's difficult on your own, no one wants to be lonely. When you experience a big injury, the first few weeks, it's kind of comforting because everyone is in your corner but then with the months of rehab, if you are out for a long time, month four or month five, you are on your own so having someone there that has been through, it is a massive help"*.

Participants noted that awareness of others may be a sports star or role model who has spoken out about their help-seeking experiencing – M-SE7: "*if you have more high profile examples of it like, people might think maybe I'll talk now and see if it helps me. It might encourage me to talk"*. However, it was also acknowledged that that person may not need

to be in the public eye – F-E6: *"even if it was just someone within your group that actually took that initiative to say I think I actually need to talk to someone about my injury or I'm not feeling okay".*

6.4.2.2.2. Attitudes, actions and opinions of others

6.4.2.2.2.1. Social support

The need for a good social support network was regarded as an important facilitator among focus group participants – F-E3: *"it's that encouragement to go get help and even a positive attitude, to say if you wanted to get help its fine"*. In particular, male and female elite and sub-elite Gaelic footballers deemed social support from the coach or management to be important.

> M-E10: *"I think that support from the coach is nearly the most important because that persons opinion matters most regards the team like so if you know he is in your corner, that is a huge benefit to you because you know that if he is in your corner, he is looking forward to me getting back playing and that can really help".*

Social support from teammates was also recognised as an important facilitator among elite male and female and sub-elite female Gaelic footballers. Participants acknowledged teammates may be aware of the demands on a player and can relate to what you are experiencing.

> F-SE5: "*if it was people who you would be playing with or at training with, if they can see you are not yourself, they are the ones who are around you so you value their opinions and their support and if they say it to you to get help, I think it would definitely be more encouraging to go get help*".

Friends and family were also reported to be important sources of social support to elite male and female Gaelic footballers and male sub-elite players – M-E9: *"support from your family and friends so you can open up to someone that you trust and explain your problem and see what they have to say if you need help or not".*

6.4.2.2.2.2. Normalising help-seeking in society

A facilitator emerging among group discussions with elite and sub-elite male and female players was normalising help-seeking – M-SE5: "*I think just seeing it as more of a normal part of injury. If it was normal, you would be more inclined to go"*. Players acknowledged seeking psychological help when injured should be seen as equivalent to other services.

F-SE8: "*it's so socially acceptable you know if you are on the physio table, you have no problem walking in, talking about it and all that but mental health, we just don't talk about it enough. If we could change that, it would be easier to get help and everyone would do it*".

Participants acknowledged that those around you may be important in normalising help-seeking.

F-E1: *"having someone say to you that it's normal and that you're not weird or you're not strange for feeling like that. For someone to say its normal to go and seek help and that they went through it and they done it as well, that you don't feel like a freak for going doing it".*

Participants also noted that normalising help-seeking may come from informal group discussions on the topic – F-E6: *"having more talks maybe. Having people coming in maybe every two months and actually sitting down and talking maybe in an informal group. Not so formal and giving everyone a chance to speak about it".* The role of the media in normalising help-seeking was also highlighted.

M-E11: *"I think more kind of media and talk about it, that it's normal now. Say when some coaches were playing like older people now that was never a thing. Kind of if you're injured, you play on but now it's kind of more talked about so it's normal. It kind of makes it easier too".*

6.4.2.2.3. Accessibility

6.4.2.2.3.1. Financial support

Access to help services was identified as a help-seeking facilitator among male and female elite and sub-elite players. In particular, participants highlighted the need for financial support in covering the cost of seeking psychological help – F-E1: "*maybe have a bit of funding there. Have it advertised that it is funded so you are not worrying about the cost as well as everything else"*. Participants acknowledged financial support for mental health issues should be equivalent to the support for physical symptoms of injury – M-SE3: "*it should be looked at as an essential thing, it should be in the same bracket as physio or going to a doctor so it should be covered by clubs*".

Players discussed the need for financial support to come from elite support structures – M-E11: *"knowing that say the county board maybe are supporting that or covering that*

cost definitely makes it easier to go get help from a psychologist". In addition, participants noted financial support from player associations may be important – M-E3: *"yeah through the GPA, you would have that covered or like that comfort alone. You wouldn't have that same worry about it".* However, it was acknowledged that elite players would have greater access to help services than their sub-elite teammates – M-E1: *"it is definitely easier for a county player than a club player. The services are provided or can be looked after by the GPA".*

6.4.2.2.3.2. Convenience of access

The convenience of access was acknowledged as an important facilitator among male and female elite and sub-elite Gaelic footballers. Firstly, access as part of the team set-up was acknowledged – F-E4: *"one of the things I think is the availability of a sports psychologist as part of the backroom team. So if it was just there, it's no big deal, just pop in".* In addition, access to professional mental health services in conjunction with physical services was noted – F-SE6: "*if someone is injured, when they are having their rehab session, make sure there is a session for a psychologist before or after, have them both the same*". It was also recognised among participants that convenient access may facilitate help-seeking as players have an established and trusting relationship with a provider before help is needed.

> M-E12: *"it's important to have that access already available so at the start of the season when no one is injured, the psychologist comes in and normalises exactly what you should be feeling and when you need to get help. I think already trusting in that person and getting to know them before you actually need the help"*.

In the discussion of the convenience of access, elite female participants also acknowledged an experience of sport of the help-provider was important – F-E8: *"you would probably feel more comfortable if they had an awareness of sport".* Elite female players noted the help-provider may have a better understanding of what they are experiencing – F-E1: "*I would feel like they would understand more, whereas if you went to someone that didn't really have any sport background, you would kind of be like oh you don't really know what I am going through".*

6.4.2.2.3.3. Access to online resources

Male and female sub-elite and female elite players reported help-seeking may be facilitated through access to online resources.

M-SE4: "*it could help with that first step of knowing the symptoms. Knowing that you can go online and look up is this normal to feel like this after I am injured as opposed to going to your manager and saying I'm feeling down. It might make it easier to go online to look*".

Participants acknowledged the benefit of an online chat.

F-SE11: "*I suppose if someone is part of a chat or something like you might see people posting up their own experiences, they are thinking it will get better, everything will be okay. They could push themselves to get that help*".

The use of online services may also be important when players find it difficult to discuss how they are feeling – F-E2: *"you have a little bit more time to think about what you are saying. It's hard to articulate it sometimes"*. In addition, use of the internet search engines to look for more information was deemed to be helpful – F-E3: *"I suppose knowing you can go to google and look up the services local to you would probably be beneficial"*. The resources available online through the player associations was also regarded as an important factor.

F-E2: *"maybe look at getting the information on the WGPA website so if someone goes to look it up on the website, instead of saying our services are 24-7, they should have information as well like if you are feeling any way so inclined with like a list of symptoms, just so people can get information there even so they can be like oh yeah it's just this I have so I can actually call the service line for this small thing even".*

6.5 Discussion

The current study provided a qualitative examination of the perceived barriers and facilitators to mental health help-seeking in Gaelic footballers following injury. Education, the perceptions of others, attitudes to seeking help and accessibility were acknowledged as barriers and facilitators to help-seeking among male and female elite and sub-elite Gaelic footballers. Despite similarities in perceived barriers and facilitators to help-seeking, differences were also evident between elite and sub-elite and between male and female Gaelic footballers. Characteristics of the help provider, in particular, their lack of experience of sport or Gaelic football, was primarily acknowledged as a barrier to help-seeking in sub-elite Gaelic footballers. Stigma from friends and family and lack of time to access services were barriers solely perceived by elite female players. Not

knowing how to seek help was a barrier unique to sub-elite female players, while knowing when to seek help acted as a facilitator in elite players only. In addition, feeling embarrassed was a barrier uniquely identified in female Gaelic players playing at the elite and sub-elite level.

Lack of knowledge of what to expect in a professional consultation was a barrier unique to elite females and sub-elite males. Not knowing the benefits or importance of seeking help and feeling it is better to manage on your own were barriers to help-seeking in elite male and female Gaelic footballers but were only acknowledged by sub-elite male players. In contrast, knowing the benefits of seeking help was a unique facilitator in elite male players. Social support from teammates, family and friends were facilitators in male and female elite players but in sub-elite players, support from teammates was unique to females, while support from family and friends was solely acknowledged by males. Similarly, access to online resources was discussed as a facilitator by sub-elite players but was only acknowledged by elite female Gaelic footballers.

6.5.1. Education

A prominent barrier and facilitator to help-seeking post-injury in male and female elite and sub-elite Gaelic footballers was education. The awareness of help-seeking services, including where and when to seek help, knowing the benefit of psychological help and what to expect in an appointment or consultation and knowledge of mental disorders and their symptoms were perceived as facilitators. Without this necessary knowledge, players acknowledged professional mental health help-seeking may be inhibited. Lack of knowledge of services and the symptoms of mental health issues have previously been identified as barriers to help-seeking among elite (Wood et al., 2017; Gulliver et al., 2012a) and collegiate athletes (Moore, 2017). Being frightened as to what to expect (Gulliver et al., 2012a) and hesitation about interacting with a mental health professional, due to uncertainties about what the therapeutic relationship would be like (Bird et al., 2020), have also previously been identified as barriers to mental health help-seeking among athletes. Similar to findings in the current study, education and awareness of mental health issues and available services have been recognised as facilitators to help-seeking in elite athletes (Gulliver et al., 2012a). Awareness and accurate knowledge of what to expect in a help-seeking encounter and the potential benefits of seeking help have also previously been recognised in student athletes (Watson, 2006).

The provision of appropriate psychological care is essential for injured athletes (Gulliver et al., 2015). Recommendations on the provision of efficient services for aiding mental health issues have acknowledged the need for a clear pathway for providing athletes with the knowledge of what support is available (Moesch et al., 2018) and when, where and who to signpost a person to if they need help (Breslin et al., 2019b). Within professional sport, athletes typically have access to a range of support systems (e.g. medical professionals, sport psychologists and/or professional coaches) (Breslin et al., 2019b) and thus, may have appropriate awareness of available mental health services. However, due to the non-professional nature of Gaelic football, highlighting the available mental health services is essential as they may not be readily available within the Gaelic football environment. In particular, it may be notably less likely that sub-elite players would have that access within the team structure and thus, highlighting available sources would be important. Highly visible and easily accessible services can allow for good utilisation of services (Moesch et al., 2018).

Mental health awareness may be provided through educational interventions promoting MHL (Bird et al., 2020), which have previously been shown to increase knowledge of mental health and types of illnesses among elite athletes (Gulliver et al., 2012b) and Irish collegiate athletes (Breslin et al., 2018). MHL interventions are essential in removing existing barriers to help-seeking to aid those experiencing sub-clinical symptoms before the development of clinical conditions (Schinke et al., 2018). By highlighting the benefits of psychological rehabilitation in conjunction with physical rehabilitation (Zakrajsek et al., 2016) and providing a greater awareness of the efficacy of treatment (Van Raalte et al., 2015), help-seeking may be facilitated. The provision of education before a player becomes injured is essential to ensure they are equipped with the necessary skills to manage mental health issues and recognise the need for help. Therefore, it is clear from the current findings that educational mental health interventions, specific to Gaelic footballers, addressing awareness of mental health disorders and help-seeking resources are essential and may facilitate help-seeking among players experiencing mental health issues post-injury.

6.5.2. Perceptions of others

Male and female elite and sub-elite Gaelic footballers identified stigma, in particular, from the coach or management, teammates or friends and family, as an important barrier

to help-seeking, which has also been identified previously in elite (Arvinen-Barrow et al., 2014; Gulliver et al., 2012a) and collegiate athletes (Moreland et al., 2018; Lopez and Levy, 2013). Educating players through MHL interventions may be beneficial in improving athlete knowledge of mental disorders, while also initiating positive attitudes towards those experiencing mental distress and increasing confidence to help those in need (Bapat et al., 2009). A MHL and destigmatizing intervention, including information regarding the prevalence and symptoms of mental disorders, help-seeking resources and evidence-based treatments and their effectiveness, has previously been utilised to decrease stigma in elite athletes (Gulliver et al., 2012b).

Reducing stigma and improving the perception of others may also be facilitated by normalising help-seeking (Moesch et al., 2018) and increasing players' awareness of others who have experienced mental health issues, key help-seeking facilitators noted in the current study. Athletes recognise that normalising mental health problems and help-seeking is important (Gulliver et al., 2012a) and by increasing awareness of others who have sought help, athletes may have greater confidence in mental health services and more positive attitudes and intentions to seeking help (Vogel et al., 2007a). However, athletes competing in individual sports are likely to have more positive attitudes towards sport psychology consulting compared to athletes involved with team sports (Rooney et al., 2021). In addition, within the team sport setting, elite athletes perceive greater acceptance of help-seeking for performance related issues (e.g. performance anxiety) than for mental health issues (e.g. depression), with athletes expressing reluctance for their teammates to find out about their mental health help-seeking (Gulliver et al., 2012a). Therefore, all stakeholders, including players, elite and sub-elite officials, support staff, governing bodies, player associations, media and sponsors play a role in encouraging an open, stigma-free environment where mental health is supported (Breslin et al., 2019b) and seeking psychological help is normalised and considered a standard component of injury rehabilitation. Within the team sport setting, a particular focus on creating acceptance and normalising help-seeking among teammates is key to facilitating mental health help-seeking in Gaelic footballers.

Improvements in attitudes towards help-seeking, where it is more acceptable for athletes to discuss mental health issues without the fear of judgement from others (Moesch et al., 2018), may be initiated by professional athletes speaking out to normalise help-seeking

and making it more popular (Barnard, 2016). Consultation with a mental health professional as standard practice when a player sustains an injury may also be an appropriate method of normalising and destigmatising help-seeking. However, due to the non-professional and recreational nature of Gaelic football participation, particularly at the sub-elite level, the feasibility of this approach is questionable, while the increased burden on struggling mental health services may also be inappropriate. Alternatively, mental health education may be beneficial, where initiation of the conversation and discussion of a sensitive topic area may normalise help-seeking. In addition, a greater understanding of mental health help-seeking in Gaelic footballers may be enabled, where everyone experiencing a mental health issue is facilitated to seek help and not just when injured, which may aid the overall aim of normalising help-seeking.

Social support from coaches and management, teammates, family and friends was recognised as an additional facilitator and similar to previous research (Gulliver et al., 2012a), encouragement and a positive attitude to help-seeking were deemed important. Collegiate athletes with greater social support have improved attitudes towards seeking professional psychological help (Nam et al., 2013), while those lacking adequate social support structures may be more reluctant to seek help compared with those with moderate or high levels of social support (Nagai, 2015). Within the Gaelic football environment, coaches are important social support structures providing that encouragement to an injured player, with 21.2% to 33.3% of elite Gaelic footballers acknowledging they would approach a coach when experiencing an emotional or mental health difficulty (Kelly et al., 2018). The coach has the ability to monitor players, initiate a conversation and flag those in need of referral (Moesch et al., 2018). However, coaches provide less emotional support to an athlete following injury (Malinauskas, 2008) and injured athletes report greater satisfaction with social support from the athletic therapist or physiotherapist than from the coach (Clement and Shannon, 2011). Nonetheless, coaches have the ability to improve the competitive environment and their relationship with athletes through adequate mental health awareness and MHL (Sebbens et al., 2016). Eliminating the view that injured athletes are worthless and educating coaches of appropriate methods of providing social support (Bejar et al., 2019) may be particularly beneficial in Gaelic football, as players note the importance of social support from their coaches.

Teammates however can provide greater emotional and reality confirmation support to injured athletes than coaches (Corbillon et al., 2008), with 41.1% of elite Gaelic

footballers indicating they would seek support from teammates when experiencing a mental health issue (Kelly et al., 2018). Social support from family can also be important as athletes are significantly more likely to seek help from a mental health professional if referred by a family member compared to a coach, teammate or self-referral (Wahto et al., 2016). Social support and the encouragement to seek help can aid athletes' mental fitness and create greater emotional wellbeing, supporting overall mental health (Souter et al., 2018).

6.5.3. Attitudes to seeking help

Negative attitudes to seeking help, in particular, feeling professional help is not necessary and the perception that it is better to manage mental health issues on your own, were acknowledged as additional key barriers among male and female elite and sub-elite Gaelic footballers, similar to previous research (Bird et al., 2020; Lopez and Levy, 2013; Gulliver et al., 2012a). Gaelic footballers are subjected to intense physical and emotional pressures (Kelly et al., 2018) and are assumed to be physically and mentally strong to be able to withstand the demands of the sport. In addition, young athletes may often be conditioned not to inform others when they are struggling and to battle through difficulties, a perception assumed to echo mental toughness (Potter, 2014). Gaelic footballers may face additional pressures due to the unique social context of the GAA in Ireland (Ipsos MRBI, 2016) and the recognition of Gaelic footballers as perceived leaders and community ambassadors (Kelly et al., 2018). Injured athletes may see the vulnerability or weakness associated with being injured as a threat to their survival as an athlete and report a sense of devalued worth (Wood et al., 2017). Players may also perceive help-seeking to be inconsistent with this perceived mental toughness and athletic identity assumed of Gaelic footballers, leading to the adaption of negative attitudes towards seeking help. However, the opposite may be helpful, where Gaelic footballers are encouraged to view mental toughness as the ability to talk about how they are feeling and ask for help (Potter, 2014), which may be facilitated through appropriate educational and destigmatising interventions.

6.5.4. Accessibility

Issues in accessing help-seeking resources were identified as a barrier among elite and sub-elite Gaelic footballers, particularly the cost of services, similar to previous research in athletes (Jewett et al., 2019; Schinke et al., 2018; Gulliver et al., 2012a). Seeking professional psychological help can be costly and physical recovery and rehabilitation

may often take precedent over psychological rehabilitation. Providing access to mental health help resources is essential, with financial support and convenience of access acknowledged as important facilitators, similar to previous research (Lopez and Levy, 2013). With the non-professional nature of Gaelic football participation, players may not have free and readily available access to mental health supports within the team environment. Thus, players may be forced to self-fund mental health help-seeking services, adding to the financial implications related to nutrition, transport and training gear already associated with playing Gaelic football (Kelly et al., 2018).

Financial support is available for elite and sub-elite Gaelic footballers through injury schemes established within the GAA and LGFA (Gaelic Athletic Association, 2019b; Ladies Gaelic Football Association, 2018). However, there is a current lack of consensus whether psychological rehabilitation services will be reimbursed under these schemes, adding to access issues when seeking help. GAA policy states medical expenses can be reimbursed but the first €100 of each claim is not covered (Gaelic Athletic Association, 2019b), whereas within the LGFA, private treatments outside of athletic therapy, physiotherapy or GP visits must be pre-approved (Ladies Gaelic Football Association, 2018). The requirement for pre-approval of treatment may be seen as an additional deterrent, where a player experiencing mental health issues is forced to disclose their issues with others prior to getting help. Elite Gaelic footballers have additional available resources and greater access to mental health supports, with free counselling services provided by the Gaelic Players Association (GPA) and Women's Gaelic Player's Association (WGPA) (Gaelic Players Association, 2019; Women's Gaelic Players Association, 2016) and some elite teams employing a sports psychologist as part of the medical team (Kelly et al., 2018). Accessibility may be improved for elite players by increasing their awareness of the available GPA and WGPA funded services available. As the majority of Gaelic football participants are involved at the sub-elite level, additional supports also need to be considered. Despite the presence of re-imbursement schemes, difficulties with cost and access to mental health services persist and policy makers within the GAA and LGFA must prioritise financial support for accessing mental health services.

Access to online resources was recognised as an additional key facilitator among female elite and male and female sub-elite Gaelic footballers, with online access to services also

previously acknowledged in elite athletes (Gulliver et al., 2012a). Acting as a novel and alternative self-help strategy, the internet allows those experiencing mental health issues to utilise online or computer-based tools to seek assistance (Rickwood and Thomas, 2012). Online services can be beneficial as there is no requirement to travel, resources are not limited by geographical boundaries (Kauer et al., 2014), services are available 24 hours a day, 7 days a week and anonymity of the help-seeker can be maintained (Gulliver et al., 2012b). Use of the internet is common, with 66.0% of Irish collegiate students searching the internet for health information (Horgan and Sweeney, 2012), with over 30.0% reporting previous use of the internet to access online mental health information and 68.0% indicating the use of online services in the future if required (Horgan and Sweeney, 2010). The recent increase in the use of technology (Ben-Zeev, 2020) and telehealth services in Ireland (Government of Ireland, 2020) for mental health care due to the Covid-19 pandemic has highlighted the usefulness of the service and its viability as an appropriate resource going forward. Thus, online resources may facilitate help-seeking and the use of reputable and appropriate online services should be promoted among Gaelic footballers.

6.5.5. Gender and Playing Level Differences

Key differences in perceived barriers and facilitators to help-seeking were also evident between genders and playing levels. Male and female sub-elite Gaelic footballers deemed the characteristics of the help provider and their lack of experience of sport or Gaelic football as an important barrier to help-seeking. Previous research has acknowledged that athletes prefer to seek help from those with knowledge and experience of sports participation (Lopez and Levy, 2013) and express worry the help-provider may not understand their problem (Gulliver et al., 2012a). Therefore, establishing a good rapport is essential (Gulliver et al., 2012a) and players must be equipped with the necessary knowledge of professional mental health help resources that understand the demands of Gaelic football and can facilitate help-seeking following injury.

Elite and sub-elite female Gaelic footballers uniquely noted feelings of embarrassment as a barrier to help-seeking, which has previously been identified in athletes (Kola-Palmer et al., 2020; Clement et al., 2015; Gulliver et al., 2012a). Embarrassment can be viewed as internalised stigma (Clement et al., 2015), where an athlete is too embarrassed to show what they perceive as a personal vulnerability or weakness of their character (Barney et

al., 2006). Feelings of embarrassment may be unique to female Gaelic footballers as women are assumed to be more compassionate and empathetic and tend to have greater insight and sensitivity into the thoughts and feelings of others compared to men (Ickes et al., 2000). Female players noted particular embarrassment when discussing help-seeking with coaches and management. Coaches are often regarded as having an implicit position of authority or power (Lorimer and Jowett, 2009a) and coaches in team sports may show less empathy than coaches involved in individual sports (Lorimer and Jowett, 2009b). In addition, female sports in Ireland have primarily male dominated coaching structures, with women generally reliant upon male coaches (Liston, 2014), which may result in subsequent disclosure issues to male coaches. It is important to consider the importance of the coach in aiding help-seeking, highlighting the need for specific interventions for Gaelic football coaches to facilitate help-seeking among players.

Lack of knowledge of how to seek help was a unique barrier in sub-elite female players, while knowing when to seek help was exclusively evident in elite Gaelic footballers. These barriers and facilitators are related to education or a lack of education but the key differences may be attributed to the opportunities to seek help afforded to elite and sub-elite players. Sub-elite players may lack the awareness of how to seek help as they do not have a convenient help-seeking pathway, possibly due to the likely lack of access to a psychologist within the sub-elite team structure that some elite teams may have. In addition, knowing when to seek help is important in elite players who may have greater knowledge and access to help-seeking services but lack the necessary knowledge of when is appropriate to seek help. Elite players are subjected to intense demands (Kelly et al., 2018; Beasley, 2015) and by balancing their sporting, professional and personal lives, may experience mental health issues, particularly when injury is an additional perceived stressor (Rice et al., 2016). Therefore, elite players may assume mental health issues are a normal aspect of elite sports participation but educational programmes are necessary to highlight when help-seeking may be necessary.

Lack of time to access services was an additional key barrier acknowledged primarily among elite female Gaelic footballers and has previously been identified in elite (Gulliver et al., 2012a) and collegiate athletes (Lopez and Levy, 2013). Time issues are not surprising as elite Gaelic footballers are balancing professional study or work commitments in tandem with the intense demands of playing elite Gaelic football (Kelly

et al., 2018). Elite male Gaelic footballers allocate on average a quarter of their day to their team commitments on a training day (Kelly et al., 2018) and although similar research in female Gaelic footballers is lacking, the demands and time commitments are assumed to be similar. However, women may face additional demands outside of sport, particularly as they spend significantly more time than men in household tasks and providing care to others (McGinnity and Russell, 2008), resulting in greater difficulties balancing their demanding schedules. Educating players on the importance of psychological support alongside physical rehabilitation when injured may be important for players to prioritise time to seek help and player associations should consider the introduction of schedule planning supports for players to allow for better time management, with additional supports available when injured.

6.6 Strengths and Limitations

The current study provides a qualitative insight into the barriers and facilitators to help-seeking perceived by Gaelic footballers using a large, representative sample. The flexibility of the investigative process, where constant comparative analysis and theoretical sampling was conducted prior to data saturation, highlights an additional key strength of the current study. In addition, a novel grounded theory explaining the factors inhibiting and facilitating help-seeking as perceived by Irish elite and sub-elite Gaelic footballers has been outlined, a cohort not previously examined. Nonetheless, mental health is a sensitive area (Breslin et al., 2019b), which Gaelic footballers may be reluctant to discuss. To account for this, participants were not required to disclose if they had previously experienced mental health issues and were encouraged to discuss their opinion of perceived barriers and facilitators affecting Gaelic footballers. Participants were also reminded of the voluntary nature of the discussion and were free to opt out of the discussion if necessary. In addition, following a necessary review of the current research in the area, the researchers may be aware of topics identified in the literature to date. This may influence data collection and interpretation, as the researcher may tend to collect and identify data that they would expect to find (Campbell, 2009), which may be considered a potential limitation. However, the voluntary nature of the discussion allowed participants to present topics to the group for discussion, allowing participants to discuss what they think is important, rather than what the researcher thinks is important, which

can sensitise the researcher to new data and interpretations not previously considered (Campbell, 2009).

Participants were not currently injured, which may have limited responses. However, participants were required to have a recent history of a moderate or severe injury and were assumed to be able to report the barriers and facilitators they perceived to affect professional mental health help-seeking from their own experience of injury. Examining barriers and facilitators to professional help-seeking post-injury may also be acknowledged as a limitation and future research should consider examining the barriers and facilitators to mental health help-seeking across all Gaelic footballers regardless of injury, which may allow for a greater understanding of whether broader-level cultural factors inhibit mental health help-seeking.

6.7 Conclusion

This research has identified lack of education, stigma, accessibility issues, negative attitudes to seeking help and characteristics of the help-provider as barriers perceived by Gaelic footballers to limit professional mental health help-seeking following injury. In contrast, factors related to education, the attitudes, actions and opinions of others and accessibility are perceived as facilitators and potential factors that could make it easier to seek professional help. Appropriate interventions are necessary to promote help-seeking that consider the facilitators recognised by players. By facilitating mental health help-seeking, players' emotional well-being and overall mental health can be sustained and Gaelic footballers may be better equipped to psychologically manage their injury and successful rehabilitation and return to play may be supported.

6.8 Summary

This findings of this chapter identify the need for appropriate interventions to reduce perceived barriers and facilitate professional mental health help-seeking following injury among Gaelic footballers at all playing levels. Evidence-based interventions that effectively increase awareness, reduce stigma and improve help-seeking when experiencing mental health issues are necessary (Schinke et al., 2018). Sports-specific educational interventions may be appropriate (Moesch et al., 2018) and thus, interventions for Gaelic footballers should include components aimed at highlighting a

greater awareness of services and MHL, the importance of social support, normalising help-seeking in society, reducing stigma and improving attitudes that promote help-seeking. Therefore, Chapter 7 involves the design and implementation of a novel educational intervention programme for Gaelic footballers to facilitate professional mental health help-seeking.

Chapter 7. The Design and Implementation of a Novel Educational Intervention Programme in Gaelic Footballers

7.1 Abstract

Background: Education, stigma and attitudes to seeking help have been acknowledged as key factors inhibiting and facilitating help-seeking in Gaelic footballers following injury. With the prevalence of the symptoms of mental health issues among Gaelic footballers and the increased risk of experiencing mental health issues following injury (Gouttebarge et al., 2016), MHL interventions are necessary.

Aim: To design and implement a novel educational intervention programme to increase MHL in Gaelic footballers.

Methods: A novel educational intervention programme specific for Gaelic footballers was designed to address the key components of MHL. The Theory of Planned Behaviour (TPB), combined with the help-seeking model, were utilised as the theoretical framework. The intervention group (N=70; 25.1±4.5 years) participated in the online 'GAA and Mental Health – Injury and a Healthy Mind' MHL educational programme. Self-Stigma of Seeking Help (SSOSH), Stigma Scale for Receiving Psychological Help (SSRPH), Attitudes Towards Seeking Professional Psychological Help Short Form (ATSPPH-SF) and Mental Health Literacy Scale (MHLS) were measured at baseline, immediately post-attendance at the MHL educational programme and 1-week and 1-month post-intervention. The control group (N=75; 24.4±6.0 years) completed measures at baseline and after a 1-week period, with follow-up measures repeated after 1-week and 1-month.

Results: SSRPH and SSOSH scores significantly decreased and ATSPPH-SF and MHLS significantly increased in the intervention group from baseline to post-intervention ($P<0.05$), with differences sustained at 1-week and 1-month follow-up. Significant differences were evident in outcome measures between groups ($P<0.05$). Positive feedback was received from intervention participants and the programme was rated to be informative.

Conclusion: Remote online delivery of a novel MHL educational programme, designed specifically for Gaelic footballers, can effectively decrease mental health stigma, improve attitudes to help-seeking and increase the recognition and knowledge of mental health issues. Gaelic footballers with improved MHL may be better equipped to manage their mental health and cope with stressors, leading to improved mental health outcomes and overall mental wellbeing of Gaelic footballers.

7.2 Introduction

MHL refers to an individual's knowledge and beliefs about mental health that aid the recognition, management or prevention of mental health issues and is defined with three key principles; recognition, knowledge and attitudes (Jorm et al., 1997). In particular, MHL focuses on knowledge about how to obtain and maintain good mental health, knowledge about mental disorders and their treatments, strategies aimed at decreasing stigma and enhancement of help-seeking efficacy (i.e., knowing when and where to seek help, knowing what to expect when seeking help and being empowered to receive the best available help) (Kutcher et al., 2015). Therefore, MHL not only refers to players' ability to identify mental health issues but also encompasses their ability to change their attitudes, overcome stigma and to seek and provide help (Gorczynski et al., 2020a).

Education, the perception of others and attitudes to seeking help, all key factors related to MHL, were identified in Chapter 6 as barriers and facilitators to mental health help-seeking among Gaelic footballers. Recent international position statements have acknowledged the need for evidence-based interventions that raise awareness, reduce stigma and increase help-seeking for athletes experiencing clinical and sub-clinical conditions (Schinke et al., 2018). In addition, the need for a sports-specific educational approach when detecting and treating mental health issues in athletes has been highlighted, which may be beneficial in normalising, preventing and detecting mental health problems and destigmatising the sensitive topic (Moesch et al., 2018). MHL interventions implemented to date have elicited efficient changes in knowledge, attitudes and stigma surrounding athlete mental health (Chow et al., 2020; Breslin et al., 2018; Kern et al., 2017; Van Raalte et al., 2015; Gulliver et al., 2012b). However, previous intervention studies have found small effect sizes or were associated with a high or unclear risk of bias (Bu et al., 2020; Breslin et al., 2018; Kern et al., 2017; Van Raalte et al., 2015; Gulliver et al., 2012b; Pierce et al., 2010). In addition, previous research has employed small sample sizes without control groups, utilised limited follow-up periods and failed to use valid or reliable psychometric measures (Breslin et al., 2017b). Previous interventions have also failed to address all domains of MHL (Kutcher et al., 2015) and did not account for cultural differences within sport impacting mental health (Breslin et al., 2017b).

The design of appropriate MHL interventions must be cognisant of personal, environmental and cultural variants that can influence the mental health of individuals and MHL interventions must be delivered in a culturally competent manner (Gorczynski et al., 2020a). Medical professionals with a detailed knowledge of mental health issues and their diagnoses and treatment (e.g., a sport psychologist, sport psychiatrist or clinical psychologist) must also be involved in the design, delivery and evaluation of MHL interventions in sport (Gorczynski et al., 2020a). The collaboration of invested stakeholders also maximises the chance of developing a successful intervention (Wight et al., 2016). In addition, mental health can be a sensitive topic and the design of a programme must ensure those who deliver the educational content have the necessary expertise and level of training required (Breslin et al., 2019b). Interventions must also be underpinned by an appropriate theoretical framework that considers the outcomes of the intervention (Breslin et al., 2017b).

Operational factors (e.g., feasibility, length of time, service user experience) must also be considered when designing a MHL intervention (Breslin et al., 2019b), and in particular, researchers must be cognisant of appropriate delivery methods. To date, in-person group delivery (Chow et al., 2020; Liddle et al., 2019; Breslin et al., 2018; Kern et al., 2017; Pierce et al., 2010; Bapat et al., 2009) and online approaches (Van Raalte et al., 2015; Gulliver et al., 2012b) have been utilised. The COVID-19 pandemic has enforced comprehensive public health guidelines and a mandate to adopt social distancing practices, which has resulted in an unprecedented use of technology in mental health care (Ben-Zeev, 2020). Mental health outcomes can be positively affected by web-based programmes when tailored to a specific population (Lustria et al., 2013) and the effectiveness and acceptability of a mental health educational programme via remote delivery has been proven (Batchelor et al., 2020; Eccles et al., 2020). In the examination of the effectiveness of MHL programmes in sport, the use of psychometrically validated, theory-informed and context-appropriate measures, which are clearly aligned with the intended outcomes of the programme are essential and must be considered when designing a novel programme (Breslin et al., 2019b).

With the prevalence of common mental disorders and increased risk of experiencing mental health issues following injury (Gouttebarge et al., 2016), MHL interventions specific to Gaelic footballers are essential. Gaelic footballers are often perceived as

leaders and role models in the community (Kelly et al., 2018; Gaelic Players Association, 2017), with injury threatening this athletic identity and increasing the risk of experiencing a mental health issue (Appaneal et al., 2009; Brewer, 1993). In addition, Gaelic footballers face extensive demands balancing sports participation with their professional and personal lives (Kelly et al., 2018) and elite Gaelic footballers, despite the non-professional nature of the sport, follow a quasi-professional training routine and can face similar demands to professional sports (Beasley, 2015). These factors highlight why MHL interventions previously developed for other athletic populations may not specifically address the barriers and facilitators to help-seeking identified in Gaelic footballers. Mental health will continue to be a major concern (Gorczynski et al., 2020a) but equipping Gaelic footballers with the necessary skills and tools to proactively manage their mental health may be of great benefit. Therefore, the current study aimed to design and implement a novel educational intervention programme to increase MHL among Gaelic footballers. It is hypothesised that participation in a MHL educational programme will decrease mental health stigma, improve attitudes to help-seeking and improve recognition and knowledge of mental health issues in Gaelic footballers.

7.3 Methodology

7.3.1. Educational Programme Design

Formative research conducted in Chapter 6 identified barriers and facilitators perceived by Gaelic footballers to inhibit and aid help-seeking. In line with recommendations by Wight et al. (2016) for designing a quality intervention, causative factors deemed to be most malleable and likely to produce the greatest change were identified. A MHL programme was deemed most appropriate to address these factors and a matrix of objectives was developed (Table 7.1). The determinants of the MHL educational programme outlined in the matrix of objectives were informed by the definition (Jorm et al., 1997) and components of MHL (Kutcher et al., 2015), while the barriers previously identified informed the details for each determinant. The intervention was also underpinned by the TPB (Ajzen, 1985) and the help-seeking model (Rickwood et al., 2005) (Table 7.1). The TPB was deemed appropriate for exploring and conceptualising help-seeking as it considers the likelihood of seeking help based on attitudes, norms and perceived control, while the help-seeking model was also incorporated due to its

specificity to mental health help-seeking (Kauer et al., 2017). The components of the theory and model addressed the determinants of the intervention as follows:

- Recognition – by improving players' recognition of mental health issues, attitudes (TPB) to seeking help may be improved and awareness of symptoms may appraise a need for support (help-seeking model).
- Knowledge – by increasing knowledge, players' awareness and the availability of resources (help-seeking model) may increase and Gaelic footballers may have improved perceived behavioural control (TPB) to seek help.
- Attitudes – by promoting attitudes that decrease stigma and enhance help-seeking efficacy, attitudes and subjective norms (TPB) may be improved. In addition, expression of symptoms and a need for support and willingness to seek out and disclose to sources of support (help-seeking model) may be facilitated.

The content of the MHL educational programme, designed to meet the learning objectives, was developed in collaboration with a multi-disciplinary group of experts, including athletic therapists, a sports scientist and a sport and exercise psychologist. The content was agreed following a comprehensive review of the literature and an examination of existing MHL educational programmes and materials (Liddle et al., 2019; Hurley et al., 2018; Breslin et al., 2017a; Gulliver et al., 2012b). A summary of the key content and theory-based methods of the novel 'GAA Mental Health – Injury and a Healthy Mind' MHL educational programme are evident in Table 7.2. Presentation slides and examples utilised throughout were designed to be specific to Gaelic footballers (Appendix AC). A Mental Health Toolkit information pack (Appendix AD) was developed based on the content of the presentation to act as an information refresher source. Due to time limitations, the programme focused on the common mental disorders, anxiety and depression, and cognitive behavioural therapy (CBT) and mindfulness as two professional help strategies.

Table 7.1 Matrix of objectives guiding intervention design

Determinant	Definition	Details of Determinant	Learning Objectives	Theoretical Framework
Recognition	Ability to recognise mental health issues	Lack of knowledge of mental disorders and their symptoms	Knowledge of mental disorders and symptoms	♦ TPB – Attitudes ♦ HSM – Awareness of symptoms and appraisal that help may be required
Knowledge	Knowledge about how to obtain and maintain mental health	Poor awareness of help-seeking services	♦ Where, when and how to get help ♦ Risk factors and causes of mental health issues ♦ Self-treatment and professional help strategies	♦ TPB – Perceived behavioural control ♦ HSM – Awareness and availability of resources
Attitudes	Attitudes that promote recognition of appropriate help-seeking: ♦ Decrease stigma ♦ Enhance help-seeking efficacy	♦ Stigma ♦ Feeling getting help is a sign of weakness ♦ Feeling professional help is not necessary	♦ Positive attitude to help-seeking and willingness to utilise professional services ♦ Normalising and acceptance of seeking help among teammates ♦ Awareness of benefits of seeking help	♦ TPB – Attitudes and Subjective Social Norms ♦ HSM – Expression of symptoms and need for support, Willingness to seek out and disclose to sources of support

Note: HSM=Help-Seeking model; TPB=Theory of Planned Behaviour

Table 7.2 'GAA Mental Health – Injury and a Healthy Mind' MHL educational programme

Determinant	Key Content	Theory-Based Method
Recognition	What is mental health and mental illness?	♦ Define mental health and mental illness to allow understanding of mental health to mental illness continuum ♦ Discuss prevalence rates among Gaelic footballers
	Mental illness disorders (clinical and sub-clinical disorders) – common symptoms	♦ Discuss DSM-V criteria for clinical conditions (depression and anxiety) ♦ Discuss symptoms of sub-clinical conditions
Knowledge	Life event stressors and situations where mental health disorders may present in sporting populations	Discuss situations where mental health may be compromised: ♦ Sports performance stressors (e.g., injury, underperforming, internal expectation to perform well) ♦ Competitive and organisational stressors (e.g., external expectations to perform well, public and media scrutiny, duration of travel time to and from training and competitions) ♦ Everyday stressors (e.g., relationship problems, family issues, academic commitments, financial pressures, career development or work-life balance)
	Where to get help?	Discuss avenues where players may seek help: ♦ General Practitioner ♦ Government resources – HSE ♦ Charities (Samaritans, Pieta House, Aware) ♦ Online resources – SpunOut.ie, myMind.org, bodyWhys.ie, turn2me.org ♦ Counselling services - Sport psychologists ♦ Athletic therapist/Physiotherapist
	How to get help?	Sources of aid: ♦ In-person ♦ By phone ♦ Online

	When to get help?	Discuss importance of seeking help when symptoms begin to impact work, relationships, education or social lives and the person is no longer able to cope
	Self-help strategies	♦ Adequate sleep ♦ Nutrition ♦ Remaining physically active/rehabilitation adherence ♦ Engaging with friends and family
	Professional help strategies	♦ Cognitive Behavioural Therapy ♦ Mindfulness
Attitudes	Facts about mental illness to eradicate 'myths' and reduce stigma	Common myths and misconceptions about mental disorders e.g., ''Mental health issues are a sign of weakness''
	Elite athletes' perspective	Videos from male and female elite Gaelic footballers to normalise help-seeking
	Benefits of psychological help	Specific benefits of seeking help on performance and recovery from injury
	Approaches to help a teammate or friend experiencing mental health issues	Mental Health in Sport Action Plan [utilised by Sebbens et al. (2016)]: ♦ Recognise ♦ Reach Out ♦ Refer ♦ Remain supportive

Note: DSM-V=Diagnostic and Statistical Manual of Mental Disorders 5th edition; HSE=Health Service Executive

7.3.2. Pilot Study

A pilot study was conducted to examine clarity of the educational content. Thirteen athletes (24.6±3.5 years; Male N=6; Female N=7) were recruited as a convenience sample. Participants were active participants in various sports, including hurling/camogie (N=8), rugby (N=1), soccer (N=1) and recreational exercise (N=3). Participants attended the presentation online via the videoconferencing platform, Zoom (San Jose, California, USA), received the information refresher pack by email and completed a Content Evaluation measure (Appendix AE) immediately following the presentation using Google Forms (California, USA). The Content Evaluation measure, previously utilised by Liddle et al. (2019) and Hurley et al. (2018), included nine rating statements responded to on a 4-point Likert scale ranging from 1 (not at all) to 4 (very) and five additional open-ended responses where participants could provide feedback on the programme

7.3.2.1. Pilot study findings

Average scores for the rating statements are evident in Table 7.3. Participants positively rated the MHL educational programme, with an overall average score of 3.5±0.4 (Table 7.3). Participants provided positive feedback and recommended changes to the programme (Table 7.4). In particular, participants acknowledged the programme as informative, relevant, clear and concise, well communicated, well designed and easy to understand. The majority of participants stated there were no elements of the programme they disliked or would change. However, feedback was provided in relation to improving the clarity, interaction and visual elements of the programme, in addition to the provision of a summary, more knowledge and information and greater real-life applicability. Participant responses were examined and the necessary changes were implemented based on the feedback (Table 7.4).

Table 7.3 Average pilot study participant content evaluation feedback scores

	M (SD)
How satisfied were you with the content of the presentation?	3.6 (0.5)
How helpful do you think the content of the presentation was?	3.6 (0.7)
How relevant do you think the content of the presentation was?	3.5 (0.7)
Overall, how much did you enjoy the presentation?	3.4 (0.7)
Overall, how much did you learn from the presentation?	3.2 (0.7)
Overall, the presenter knew the content well and communicated it clearly.	3.5 (0.7)
How important do you think the content of the presentation was?	3.8 (0.4)
Overall, how easy was the content of the presentation to understand?	3.7 (0.5)
Overall, how likely are you to recommend this presentation to a friend?	3.5 (0.7)
Total	**3.5 (0.4)**

Note: M=mean score; SD=standard deviation

Table 7.4 Participant feedback and changes to MHL educational programme

Feedback suggestion	Change implemented
A basic introduction to techniques such as mindfulness, CBT and basic concepts of positive psychology	Definitions of CBT and mindfulness were added to the presentation.
Increase clarity of sub-clinical issues	A clearer explanation, with definitions and greater detail, was outlined.
♦ Consider getting a well-known sports person to contribute ♦ A video clip would be good	Male and female elite Gaelic footballers were invited to contribute a video. The players who contributed outlined the importance of mental health and seeking help when experiencing any issues from their perspectives and experiences.
More specific examples of what might cause problems	A case study of a Gaelic footballer experiencing mental health issues following injury was included.
Provide a summary	A summary was added at the end of the presentation highlighting the key take home messages.
The addition of a "mental health toolkit" section which acts as a summary of what to look out for, and what actions an individual can personally take to support their mental well-being.	These issues were addressed in the presentation. Further clarity of the supplementary information pack was completed and was re-termed the 'Mental Health Toolkit Information Pack' to highlight the future use of the information pack as a toolkit for improved mental health.
Shorten bullet points	Visual improvements to the slides was completed to reduce text.
Interaction	From previous use of online platforms to deliver content, the research team agreed interaction and questioning throughout the presentation may not be possible due to technical issues. Alternatively, participants were given an opportunity to ask questions at the end of the presentation.

Note: CBT=Cognitive Behavioural Therapy

7.3.3. Implementation of Intervention

7.3.3.1. Design

A quasi-experimental design was utilised. This study adopted a between (group) and within group (time) design. The between group factor had two levels; intervention and control. The within group factor had four levels based on time point of completion of measures; baseline (T1), immediately post-intervention (T2), 1-week post-intervention (T3) and 1-month post-intervention (T4).

7.3.3.2. Participants

The target sample was 136 participants (intervention group=68; control group=68). This sample size calculation was determined in G*Power using an estimated effect size of 0.25, based on data from previous internet-based mental health interventions (Gulliver et al., 2012b), with 80.0% power at alpha equal to 0.05 assuming a correlation between pre- and post-intervention of 0.5. Previous mental health interventions in athletes have shown 66.0% to >80.0% follow-up rates (Breslin et al., 2017b) and thus, a 30.0% attrition rate was suggested to be beneficial for the current study to account for dropout and incomplete response to measures. However, due to circumstances and uncertainties related to Covid-19 at the time of data collection, the sample size was adjusted to account for a 50.0% attrition rate.

One hundred and sixty male and female Gaelic footballers were recruited to an intervention group (N=85) or control group (N=75). Participant recruitment was conducted via social media [Twitter (@GFIP_Study), Facebook (@GFIPStudy) and Instagram (@GFIP_Study)]. Ethical approval was granted by the AIT Research Ethics Committee (#20191104) and participants received a participant information sheet and provided informed consent at baseline (Appendix AF).

7.3.3.3. Procedure

The intervention group received the 'GAA Mental Health – Injury and a Healthy Mind' MHL educational programme. At baseline, intervention participants completed initial measures online using Google Forms and selected a time to attend the online presentation facilitated by the sports and exercise psychologist. Follow-up measures, which were emailed to participants, were completed immediately after attending the Zoom presentation and at 1-week and 1-month post. Reminders were not necessary for measures completed immediately post-intervention but a reminder email was sent after 2 days to participants who failed to complete follow-up measures at 1-week and 1-month, with responses accepted up to 3 days after reminders were issued. Following the completion of all repeat measures, intervention group participants were emailed the Process Evaluation measure (Liddle et al., 2019; Hurley et al., 2018) (Appendix AE) determining their feedback on the MHL educational programme. The control group completed measures at baseline and as they did not receive the intervention, a 1-week period was

allowed before post-intervention measures were completed, which were also repeated after 1-week and 1-month.

7.3.3.4. Intervention

The 25-minute 'GAA Mental Health – Injury and a Healthy Mind' presentation was designed to educate Gaelic footballers with regard to their recognition, knowledge and attitudes towards mental health following injury. The MHL educational programme was delivered in small groups (range: 1-8 participants) via PowerPoint presentation using Zoom, at a convenient time selected by each participant at baseline. The presentation was facilitated by a qualified sports psychologist with masters and doctoral qualifications and experience working in the sports industry. Delivery by a sport and exercise psychologist is the preferred method as a qualified facilitator can utilise their professional expertise to discuss and explore questions and concerns from players (Purcell et al., 2019). Training was provided for the facilitator prior to the beginning of the scheduled presentations, which included a detailed presentation plan and script. Following the presentation, participants were given an opportunity to ask questions. The primary researcher was also present for all online presentations. Participants were also provided with a Mental Health Toolkit Information Pack (Appendix AD) by email, outlining key content from the programme to allow participants to refresh their knowledge when necessary.

7.3.3.5. Measures

7.3.3.5.1. Stigma Scale for Receiving Psychological Help

The Stigma Scale for Receiving Psychological Help (SSRPH) (Komiya et al., 2000) is a 5-item unidimensional measure used to assess perceived stigma towards seeking professional mental health treatment (Appendix O). Items are rated using a 4-point Likert scale ranging from 0 (strongly disagree) to 3 (strongly agree) and total scores can range from 0 to 15. Higher scores indicate greater perceived stigma associated with receiving professional psychological treatment. The measure has been shown to have good content and construct validity (Komiya et al., 2000), while also having good internal consistency in athletic populations (Hilliard et al., 2019a; Wahto et al., 2016; Steinfeldt et al., 2009). Good internal consistency of SSRPH was shown in the current sample of Gaelic footballers at T1 (α=0.78), T2 (α=0.93), T3 (α=0.90) and T4 (α=0.92).

7.3.3.5.2. Self-Stigma of Seeking Help Scale

The Self-Stigma of Seeking Help scale (SSOSH) (Vogel et al., 2006) is a 10-item scale used to measure a respondents negative views toward themselves for seeking

psychological help (Appendix P). Items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items 2, 4, 5, 7 and 9 are reverse scored with all 10-items summed to give a total score ranging from 10 to 50. Higher scores indicate greater levels of self-stigma. SSOSH is a valid and reliable measure of self-stigma (Vogel et al., 2006) and was shown to have good internal consistency when utilised with athletes (Hilliard et al., 2019a; Bird et al., 2018; Wahto et al., 2016; Steinfeldt and Steinfeldt, 2012), with test-retest reliability of the measure also confirmed (r=0.72) (Vogel et al., 2006). SSOSH was shown to have good internal consistency in the current sample at T1 (α=0.85), T2 (α=0.92), T3 (α=0.91) and T4 (α=0.93).

7.3.3.5.3. Attitudes Towards Seeking Professional Psychological Help – Short Form

Attitudes towards Seeking Professional Psychological Help Short Form (ATSPPH-SF) (Fischer and Farina, 1995) is a 10-item measure assessing the degree to which respondents agree with statements regarding seeking help from a mental health professional (Appendix N). The measure was adapted from the original 29-item scale developed by Fischer and Turner (1970). Items are rated on a 4-point Likert-type scale ranging from 0 (disagree) to 3 (agree). Items 2, 4, 8, 9, and 10 are reverse scored and scores from all 10 responses are summed. Total scores range from 0 to 30, with higher scores indicating more positive attitudes toward seeking professional psychological help. ATSPPH-SF has good internal consistency (Hilliard et al., 2019a; Hilliard et al., 2019b; Gulliver et al., 2012b; Steinfeldt and Steinfeldt, 2010) and test-retest reliability (Gulliver et al., 2012b) among athletes. Good internal consistency of ATSPPH-SF was shown in the current sample of Gaelic footballers at T1 (α=0.78), T2 (α=0.92), T3 (α=0.91) and T4 (α=0.92).

7.3.3.5.4. Mental Health Literacy Scale

The Mental Health Literacy Scale (MHLS) (O'Connor and Casey, 2015) is a 35-item scale used to measure MHL. Three Likert rating scales are utilised to score subscales of the measure (Appendix R). The ability to recognise disorders (8 items), knowledge of risk factors and causes (2 items) and knowledge of professional help available (3 items) are measured using a 4-point Likert scale ranging from 1 (very unlikely) to 4 (very likely). Knowledge of self-treatment (2 items) is measured using a 4-point Likert scale ranging from 1 (very unhelpful) to 4 (very helpful). Knowledge of where to seek information (4 items) and nine of the items of attitudes that promote recognition or appropriate help-

seeking behaviour are rated using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The final seven items of the attitudes that promote recognition or appropriate help-seeking behaviour are rated on a 5-point Likert scale ranging from 1 (definitely unwilling) to 5 (definitely willing). Items 10, 12, 15 and 20-28 are reverse scored. The 35-items of MHLS can be divided into three subscales, measuring recognition (N=8), knowledge (N=11) and attitudes (N=16). A total score is achieved by summing all items, with scores ranging from 35 to 160 and higher scores indicating greater levels of MHL. Internal consistency and test-retest reliability of the 35-item measure has been shown (O'Connor and Casey, 2015). MHLS may be used to examine all three major components of MHL with due regard to cultural context (Gorczynski et al., 2020a). MHLS had good internal consistency in the current sample at T1 (α=0.91), T2 (α=0.97), T3 (α=0.96) and T4 (α=0.96).

7.3.3.5.5. Brunel Mood Scale

The Brunel Mood Scale (BRUMS) (Terry et al., 1999) is a 24-item measure used to assess mood states (Appendix AG). The measure is composed of six subscales; tension, depression, anger, fatigue, confusion and vigour (Terry et al., 1999). Items are rated on a 5-point Likert scale, ranging from 0 (not at all) to 4 (extremely), with respondents selecting an appropriate response for each item based on how they are feeling right now. Total subscale scores can range from 0 to 16. Total Mood Disturbance (TMD) is calculated by subtracting the positive vigour subscale from the sum of the five negative mood state subscales (tension, depression, anger, fatigue and confusion) and adding a constant of 100 to eliminate negative values (Kemp et al., 2019). Higher TMD score is indicative of greater mood disturbance and greater negative mood. Content and criterion validity are supported for use of the measure among athletic populations (Terry et al., 2003; Terry et al., 1999). Good internal consistency is evident for each subscale (α=0.75-0.86) (Terry et al., 1999). BRUMS is deemed a psychometrically robust measure suitable for use in athletic populations, while its brevity highlights its benefit in web-based mood profiling (Parsons-Smith et al., 2017). In the current sample, BRUMS displayed good internal consistency at T1 (α=0.89), T2 (α=0.92), T3 (α=0.92) and T4 (α=0.89).

7.3.4. Statistical Analysis

Data were analysed using IBM SPSS software version 25 (IBM, New York, USA). Significance of 0.05 was set for all statistical tests ($P \leq 0.05$). Descriptive statistics were conducted to examine participant characteristics and separate independent samples T-

tests, Pearson chi-square tests or Fisher's exact tests determined if differences were evident between the intervention and control group. Linear mixed modelling (LMM) was utilised to examine differences between groups over time for each of the dependant variables (SSRPH, SSOSH, ATSPPH-SF and MHLS). LMM was deemed appropriate as it accounts for the presence of missing data, unequal variances and correlated data that is common with repeated measurements on individual participants (Becker et al., 2012). Analyses adopted the intention-to-treat principle, which allows for an unbiased estimate of treatment effect and minimises type I error (Gupta, 2011). LMM was conducted with group, time and group by time interaction treated as fixed effects and participant as a random effect. BRUMS total mood disturbance score was treated as a covariate in all models tested in order to control for mood, as mental wellbeing is associated with greater MHL (Bjornsen et al., 2019; Lam, 2014). The individual participants in each group were assessed as a repeated effect using the unstructured covariance matrix. Bonferroni adjustments for multiple comparisons were applied to limit type-I error. Effect sizes, determined using Cohen's d, were classified as small (d=0.2), medium (d=0.5) and large (d=0.8) (Cohen, 1988). Descriptive statistics were determined for the process evaluation responses and open-ended responses were coded and summarised. Internal consistency of SSRPH, SSOSH, ATSPPH-SF, MHLS and BRUMS in Gaelic footballers was determined using Cronbach's alpha, with $\alpha \geq 0.70$ indicating good internal consistency (Hinton et al., 2004).

7.4 Results

7.4.1. Baseline

Eighty-five participants were recruited to the intervention group, of which, 70 (male N=26 and female N=44; 25.1± 4.5 years) attended the online Zoom presentation and were included in analyses. Seventy-five participants (male N=29 and female N=46; 24.4±6.0 years) were recruited to the control group. Characteristics of participants in the intervention and control group are evident in Table 7.5. No significant differences were evident in gender, age, education level, current playing level, years playing Gaelic football or injury history between the intervention and control group ($P>0.05$).

Table 7.5 Participant demographic information

	Intervention N=70	Control N=75	P
Gender	Male N=26 Female N=44	Male N=29 Female N=46	0.85
Age (years)*	25.1 (4.5)	24.4 (6.0)	0.44
Highest level of education completed to date	Post-primary N=19 Bachelors N=34 Masters N=14 Doctorate N=1 Other N=2	Post-Primary N=30 Bachelors N=27 Masters N=14 Doctorate N=1 Other N=3	0.47
Current playing level	Sub-elite N=54 Elite & sub-elite N=16	Sub-elite N=64 Elite & sub-elite N=11	0.21
Gaelic football experience (years)*	15.4 (5.0)	15.9 (5.7)	0.55
History of injury	Minor N=8 Moderate N=11 Severe N=47 None N=4	Minor N=7 Moderate N=16 Severe N=49 None N=3	0.81

Note: N=number of participants; P=significance; *years (SD)

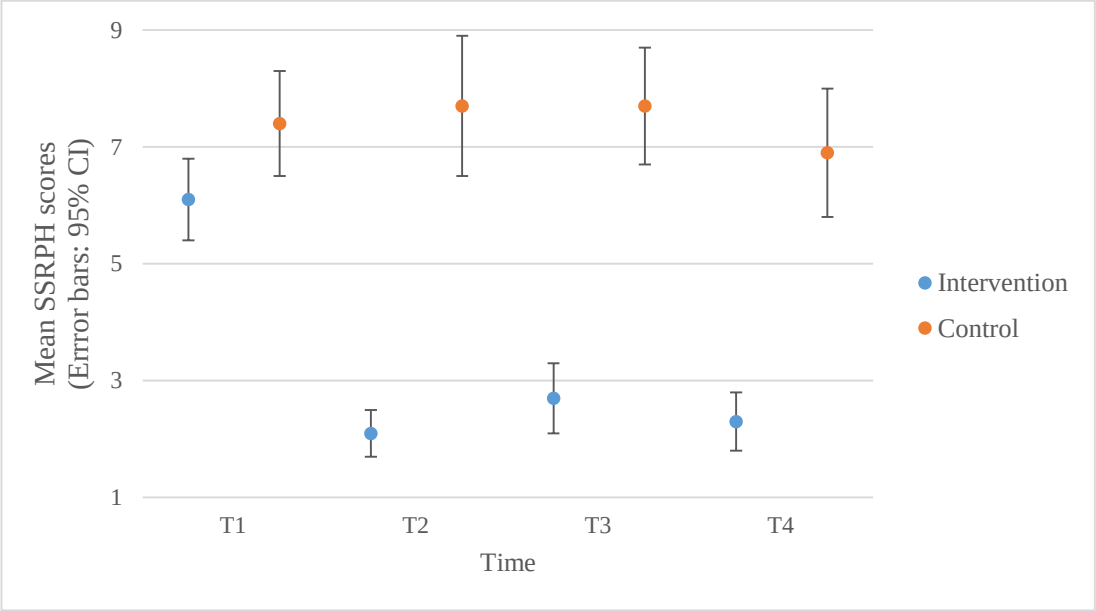
Average scores in outcome measures at baseline and post-intervention are evident in Table 7.6. There was a significant difference in SSRPH scores between the intervention (6.2±3.3) and control group (7.4±4.1) at baseline (T1) (P=0.04; d=0.3). Similarly, significant differences were evident in SSOSH scores at T1 between the intervention group (23.9±5.5) and control group (27.2±7.3) (P=0.002; d=0.5). No significant differences were evident in ATSPPH-SF, MHLS, MHLS-Recognition, MHLS-Knowledge, MHLS-Attitudes or BRUMS scores between the intervention and control group at T1 (P>0.05).

7.4.2. Outcome measures

7.4.2.1. SSRPH

There was a significant group-by-time interaction for SSRPH scores [F(3, 124.1)= 22.9; P<0.001] (Table 7.6). SSRPH scores in the intervention group significantly decreased from T1 to T2 (P<0.001; d=1.7), T1 to T3 (P<0.001; d=1.3) and T1 to T4 (P<0.001; d=1.5) (Table 7.7). SSRPH scores were not significantly different between T2, T3 and T4 (P<0.05). No significant differences were evident in the control group between T1, T2, T3 and T4 (P>0.05) (Table 7.7). Significant differences in SSRPH scores were

evident between the intervention and control group at T2 (P<0.001; d=1.8), T3 (P<0.001; d=1.6) and T4 (P<0.001; d=1.5) (Figure 7.1).



Note: T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; SSRPH=Stigma Scale for Receiving Psychological Help

Figure 7.1 SSRPH scores per group across the intervention period (Mean, 95% CI)

Table 7.6 Mean (SD) and Group x Time interaction effects of outcome measures

Outcome measure	Group	T1 M (SD)	T2 M (SD)	T3 M (SD)	T4 M (SD)	Group x Time F (df)	P
SSRPH	**Intervention**	6.2 (3.3)	2.1 (1.7)	2.7 (2.2)	2.3 (2.0)	22.9 (3,124.1)	<0.001
	Control	7.4 (4.1)	7.7 (4.6)	7.7 (3.9)	6.9 (4.3)		
SSOSH	**Intervention**	23.9 (5.5)	19.6 (5.8)	20.1 (5.7)	19.9 (6.5)	9.6 (3, 124.9)	<0.001
	Control	27.2 (7.3)	29.3 (10.7)	28.2 (9.2)	27.5 (10.0)		
ATSPPH-SF	**Intervention**	20.0 (4.6)	23.8 (4.5)	24.1 (4.7)	23.6 (5.1)	17.4 (3, 127.2)	<0.001
	Control	18.5 (5.7)	16.0 (8.4)	17.8 (7.4)	17.8 (8.1)		
MHLS Recognition	**Intervention**	26.1 (2.4)	28.8 (2.9)	28.9 (3.1)	28.8 (3.1)	14.3 (3, 125.9)	<0.001
	Control	25.3 (3.4)	24.4 (4.2)	25.4 (3.8)	25.7 (3.9)		
MHLS Knowledge	**Intervention**	36.4 (3.8)	40.6 (3.7)	40.5 (3.5)	40.3 (3.2)	23.3 (3, 125.4)	<0.001
	Control	35.1 (4.8)	33.8 (6.5)	34.7 (5.5)	34.3 (5.2)		
MHLS Attitudes	**Intervention**	66.9 (8.8)	72.7 (8.3)	72.0 (9.1)	73.2 (7.6)	29.2 (3, 118.5)	<0.001
	Control	65.4 (12.0)	57.9 (19.3)	59.7 (15.2)	59.7 (16.5)		
MHLS	**Intervention**	129.5 (10.9)	142.0 (11.9)	141.4 (12.8)	142.3 (11.6)	38.8 (3, 118.4)	<0.001
	Control	125.8 (17.8)	116.1 (28.5)	119.9 (22.3)	119.6 (23.6)		

Note: M=mean; T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; SD=standard deviation; df=degrees of freedom; P=significance; SSRPH=Stigma Scale for Receiving Psychological Help; SSOSH=Self-Stigma of Seeking Help; ATSPPH-SF=Attitudes Towards Seeking Professional Psychological Help Short Form; MHLS=Mental Health Literacy Scale

Table 7.7 Outcome measures within and between group changes

	SSRPH	SSOSH	ATSPPH-SF	MHLS	MHLS Recognition	MHLS Knowledge	MHLS Attitudes
Between group changes across time							
Intervention – Control							
				MD (95% CI)			
Time 1	-1.3* (-2.5, -0.4)	-3.4** (-5.5, -1.2)	1.5 (-0.2, 3.2)	3.7 (-1.2, 8.6)	0.8 (-0.2, 1.8)	1.4 (-0.1, 2.8)	1.6 (-1.9, 5.0)
d	0.3	0.5	0.3	0.3	0.3	0.3	0.2
Time 2	-5.7*** (-6.8, -4.5)	-9.6*** (-12.3, -6.8)	7.6*** (5.4, 9.8)	26.1*** (19.1, 33.1)	4.5*** (3.3, 5.7)	6.8*** (5.0, 8.5)	14.9*** (10.1, 19.6)
d	1.8	1.2	1.2	1.3	1.2	1.3	1.1
Time 3	-5.0*** (-6.0, -3.9)	-7.3*** (-9.9, -4.7)	5.9*** (3.9, 8.0)	20.6*** (14.6, 26.6)	3.3*** (2.1, 4.5)	5.5*** (3.9, 7.1)	11.8*** (7.7, 16.0)
d	1.6	1.1	1.0	1.2	1.0	1.3	1.0
Time 4	-4.8*** (-5.9, -3.6)	-7.9*** (-10.7, -5.2)	6.2*** (4.0, 8.4)	22.3*** (16.3, 28.3)	3.1*** (2.0, 4.3)	6.1*** (4.7, 7.6)	13.2*** (9.0, 17.4)
d	1.5	0.9	0.9	1.3	0.9	1.4	1.1
Within group changes across time							
Intervention group							
				MD (95% CI)			
Time 1-Time 2	-4.1*** (-5.2, -3.0)	-4.3*** (-6.5, -2.1)	3.8*** (2.1, 5.4)	12.5*** (7.5, 17.5)	2.6*** (1.6, 3.7)	4.1*** (2.7, 5.5)	5.8*** (2.4, 9.2)

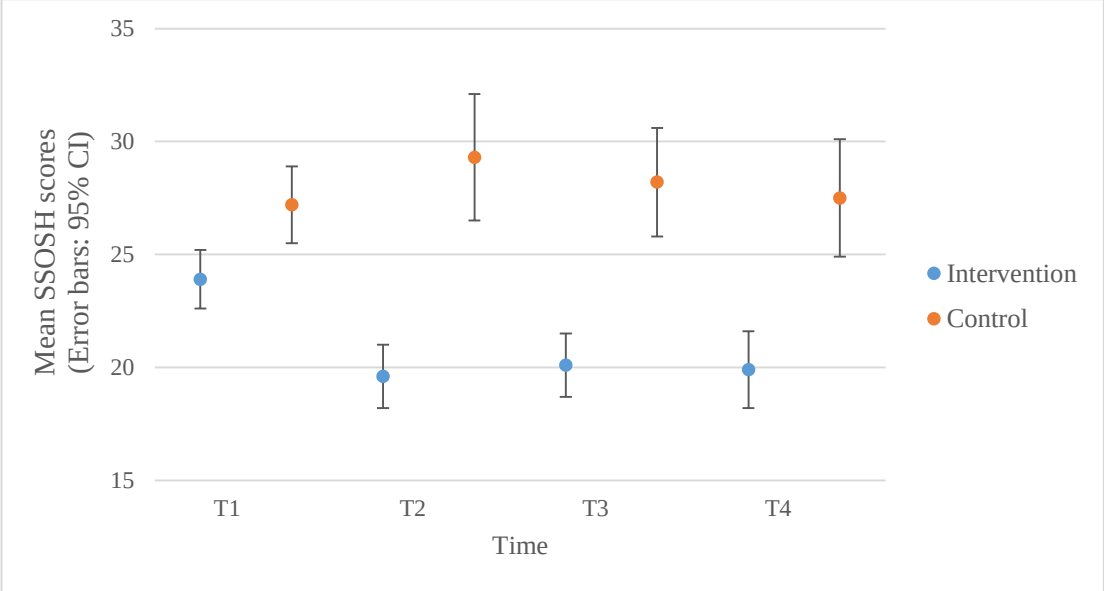
d	1.7	0.8	0.8	1.1	1.0	1.1	0.7
Time 1-Time 3	-3.5*** (-4.5, -2.6)	-3.4*** (-5.4, -1.3)	3.9*** (2.4, 5.5)	11.5*** (7.8, 15.2)	2.8*** (1.8, 3.7)	3.9*** (2.7, 5.1)	4.8*** (2.2, 7.4)
d	1.3	0.7	0.9	1.0	1.0	1.1	0.6
Time 1-Time 4	-4.0*** (-5.1, -2.9)	-4.4*** (-6.5, -2.2)	4.0*** (2.3, 5.7)	12.8*** (9.1, 16.5)	2.9*** (1.9, 3.8)	4.0*** (2.8, 5.2)	6.0*** (3.4, 8.7)
d	1.5	0.7	0.8	1.1	1.0	1.1	0.8
Time 2-Time 3	0.6 (-0.3, 1.5)	0.9 (-1.1, 3.0)	0.1 (-1.5, 1.7)	-1.0 (-5.5, 3.5)	0.1 (-0.8, 1.1)	-0.2 (-1.4, 1.0)	-1.0 (-4.1, 2.2)
d	0.3	0.1	0.1	0.1	0.0	0.0	0.1
Time 2-Time 4	0.1 (-0.7, 1.0)	-0.1 (-2.0, 1.9)	0.2 (-1.3, 1.7)	0.3 (-4.2, 4.7)	0.2 (-0.8, 1.2)	-0.1 (-1.4, 1.2)	0.2 (-2.7, 3.2)
d	0.1	0.0	0.0	0.0	0.0	0.1	0.1
Time 3-Time 4	-0.5 (-1.2, 0.3)	-1.0 (-2.6, 0.6)	0.1 (-1.1, 1.3)	1.3 (-2.2, 4.8)	0.1 (-0.6, 0.9)	0.1 (-1.0, 1.1)	1.2 (-1.2, 3.7)
d	0.2	0.0	0.1	0.1	0.0	0.1	0.2
Control group							
			MD (95% CI)				
Time 1-Time 2	0.3 (-0.9, 1.5)	1.9 (-0.4, 4.2)	-2.3** (-4.0, -0.5)	-9.8*** (-15.2, -4.5)	-1.0 (-2.2, 0.1)	-1.3 (-2.7, 0.2)	-7.5*** (-11.2, -3.9)
d	0.1	0.2	0.3	0.4	0.2	0.2	0.5
Time 1-Time 3	0.2 (-0.8, 1.1)	0.6 (-1.5, 2.6)	-0.5 (-2.1, 1.1)	-5.4*** (-9.2, -1.6)	0.3 (-0.7, 1.2)	-0.2 (-1.4, 1.0)	-5.5*** (-8.1, -2.9)
d	0.1	0.1	0.1	0.3	0.0	0.1	0.4

Time 1-Time 4	-0.5 (-1.6, 0.6)	0.2 (-2.0, 2.4)	-0.7 (-2.4, 1.0)	-5.8*** (-9.5, -2.1)	0.5 (-0.4, 1.5)	-0.8 (-2.0, 0.5)	-5.6*** (-8.3, -3.0)
d	0.1	0.0	0.1	0.3	0.1	0.2	0.4
Time 2-Time 3	-0.1 (-1.1, 0.9)	-1.3 (-3.6, 0.9)	1.8* (0.0, 3.5)	4.4 (-0.5, 9.4)	1.3** (0.3, 2.3)	1.1 (-0.3, 2.4)	2.0 (-1.4, 5.5)
d	0.0	0.1	0.2	0.1	0.3	0.1	0.1
Time 2-Time 4	-0.8 (-1.7, 0.2)	-1.7 (-3.8, 0.4)	1.6 (-0.1, 3.2)	4.0 (-0.8, 8.9)	1.6*** (0.5, 2.6)	0.5 (-0.9, 1.9)	1.9 (-1.4, 5.1)
d	0.2	0.2	0.2	0.1	0.3	0.1	0.1
Time 3-Time 4	-0.6 (-1.4, 0.1)	-0.4 (-2.0, 1.3)	-0.2 (-1.4, 1.0)	-0.4 (-4.0, 3.2)	0.3 (-0.5, 1.0)	-0.5 (-1.6, 0.5)	-0.2 (-2.7, 2.4)
d	0.2	0.1	0.0	0.0	0.1	0.1	0.0

Note: SSRPH=Stigma Scale for Receiving Psychological Help; SSOSH=Self-Stigma of Seeking Help; ATSPPH-SF=Attitudes Towards Seeking Professional Psychological Help Short Form; MHLS=Mental Health Literacy Scale; MD=mean difference; 95% CI=95% confidence interval; T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; d=Cohen's d effect size; *P≤0.05; **P≤0.01; ***P≤0.001

7.4.2.2. SSOSH

A significant group-by-time interaction effect was evident for SSOSH scores [F(3,124.9)= 9.6; P<0.001] (Table 7.6). SSOSH scores in the intervention group significantly decreased from T1 to T2 (P<0.001; d=0.8), T1 to T3 (P<0.001; d=0.7) and T1 to T4 (P<0.001; d=0.7) (Table 7.7). SSOSH scores were not significantly different between T2, T3 and T4 (P>0.05). No significant differences were evident in the control group between T1, T2, T3 and T4 (P>0.05) (Table 7.7). Significant differences were evident in SSOSH scores between the intervention and control group at T2 (P<0.001; d=1.2), T3 (P<0.001; d=1.1) and T4 (P<0.001; d=0.9) (Figure 7.2).



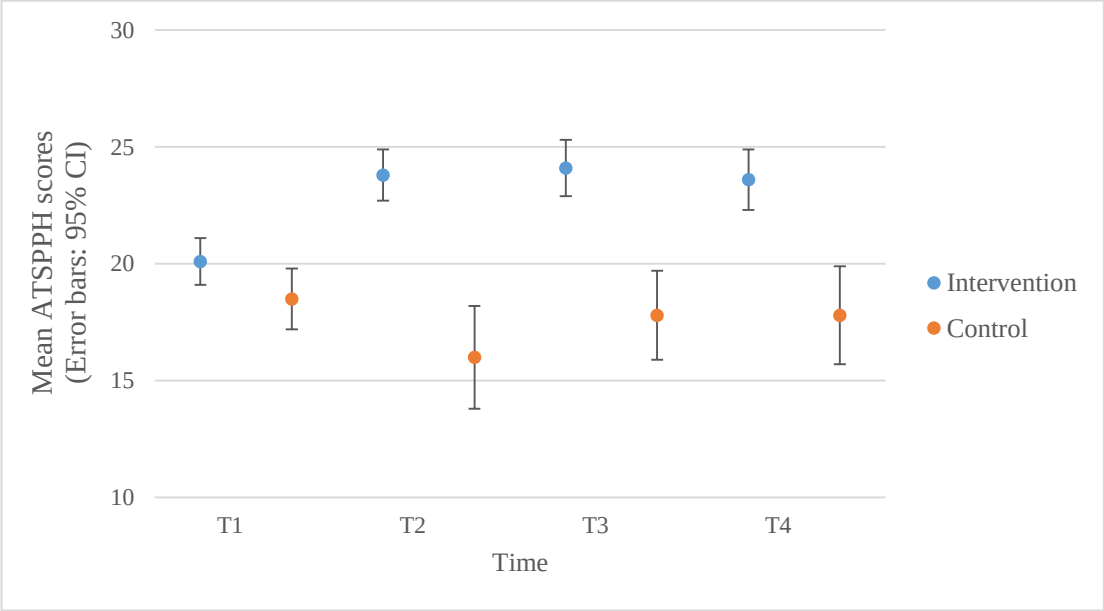
Note: T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; SSOSH=Self-Stigma of Seeking Help scale

Figure 7.2 SSOSH scores per group across the intervention period (Mean, 95% CI)

7.4.2.3. ATSPPH-SF

ATSPPH-SF displayed a significant group-by-time interaction effect [F(3,127.2)= 17.4; P<0.001] (Table 7.6). For the intervention group, ATSPPH-SF scores significantly increased from T1 to T2 (P<0.001; d=0.8), T1 to T3 (P<0.001; d=0.9) and T1 to T4 (P<0.001; d=0.7) (Table 7.7). ATSPPH-SF scores were not significantly different between T2, T3 and T4 (P>0.05). For the control group, ATSPPH-SF scores significantly decreased from T1 to T2 (P=0.004; d=0.3) and significantly increased between T2 and T3 (P=0.05; d=0.2) (Table 7.7). Significant differences were evident in ATSPPH-SF

scores between the intervention and control group at T2 (P<0.001; d=1.2), T3 (P<0.001; d=1.0) and T4 (P<0.001; d=0.9) (Figure 7.3).



Note: T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; ATSPPH-SF=Attitudes Towards Seeking Professional Psychological Help Short Form

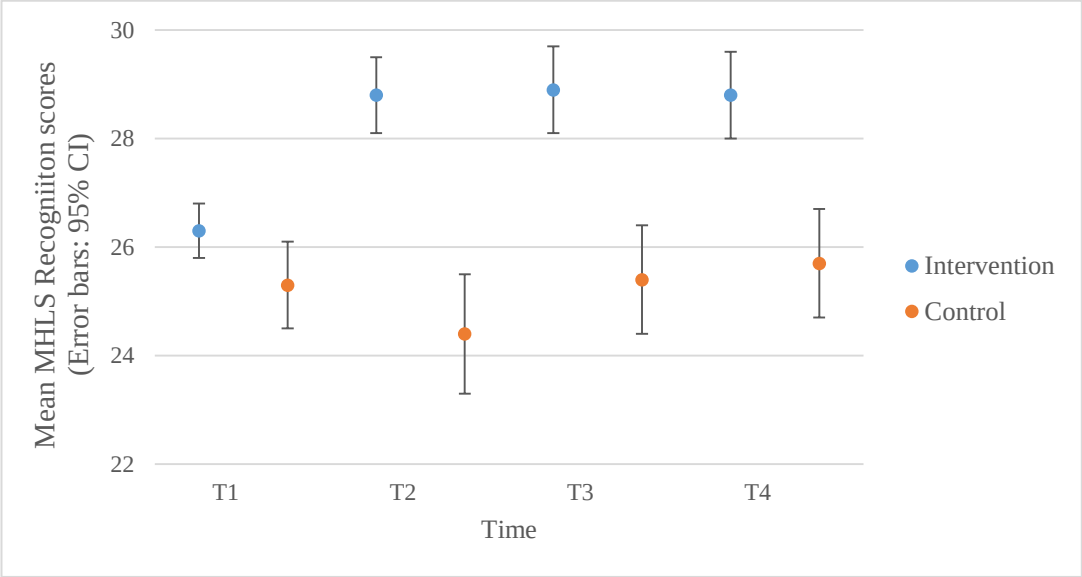
Figure 7.3 ATSPPH-SF scores per group across the intervention period (Mean, 95% CI)

7.4.2.4. MHLS

There was a significant group-by-time interaction effect for MHLS scores [F(3, 118.4)=38.8; P<0.001] (Table 7.6). Similarly, significant group-by-time interaction effects were evident for recognition [F(3,125.9)=14.3; P<0.001], knowledge [F(3,125.4)=23.3; P<0.001] and attitude subscales [F(3,118.5)=29.2; P<0.001] (Table 7.6).

In the intervention group, MHLS Recognition scores significantly increased from T1 to T2 (P<0.001; d=1.0), T1 to T3 (P<0.001; d=1.0) and T1 to T4 (P<0.001; d=1.0) (Table 7.7). MHLS Recognition scores in the intervention group were not significantly different between T2, T3 and T4 (P>0.05). For the control group, MHLS Recognition scores significantly increased from T2 to T3 (P=0.007; d=0.3) and T2 to T4 (P=0.001; d=0.3) (Table 7.7). Significant differences were evident in MHLS Recognition scores between

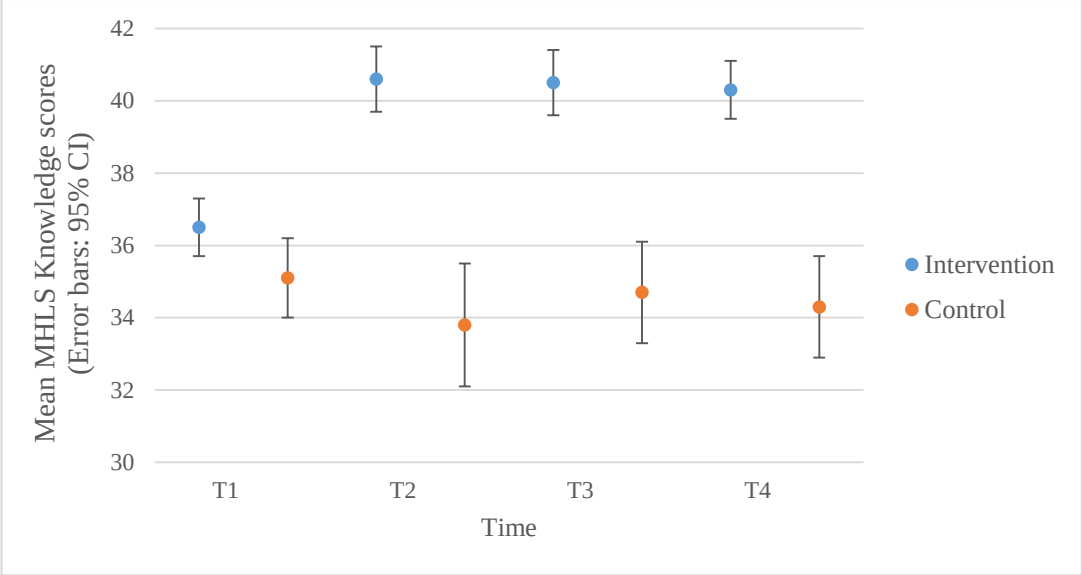
the intervention and control group at T2 (P<0.001; d=1.2), T3 (P<0.001; d=1.0) and T4 (P<0.001; d=0.9) (Figure 7.4).



Note: T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; MHLS=Mental Health Literacy Scale

Figure 7.4 MHLS Recognition scores per group across the intervention period (Mean, 95% CI)

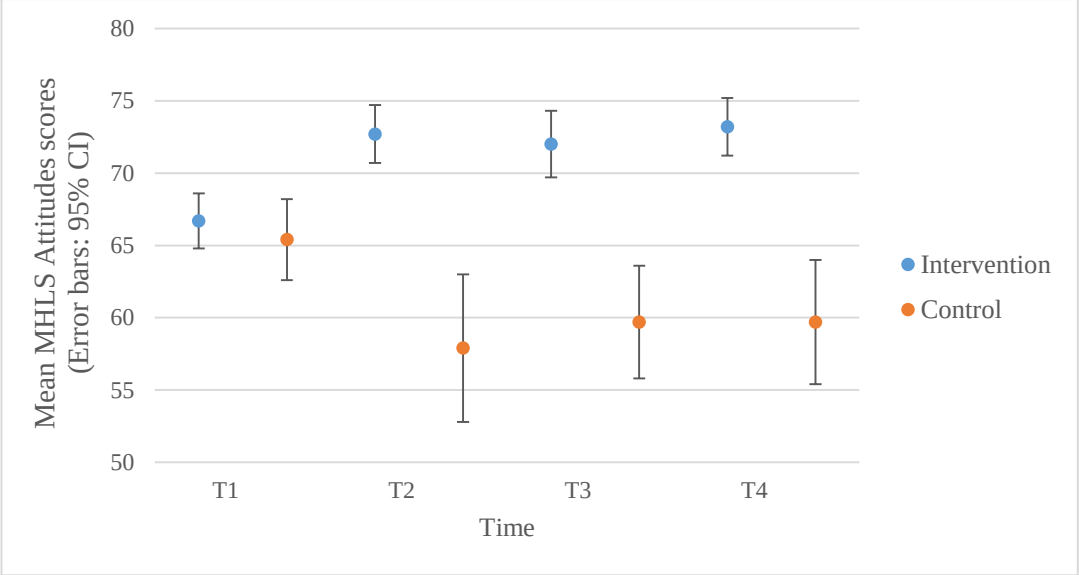
MHLS Knowledge scores in the intervention group significantly increased from T1 to T2 (P<0.001; d=1.1), T1 to T3 (P<0.001; d=1.1) and T1 to T4 (P<0.001; d=1.1) (Table 7.7). MHLS Knowledge scores in the intervention group were not significantly different between T2, T3 and T4 (P>0.05). No significant differences were evident in the control group between T1, T2, T3 and T4 (P>0.05) (Table 7.7). Significant differences were evident in MHLS Knowledge scores between the intervention and control group at T2 (P<0.001; d=1.3), T3 (P<0.001; d=1.3) and T4 (P<0.001; d=1.4) (Figure 7.5).



Note: T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; MHLS=Mental Health Literacy Scale

Figure 7.5 MHLS Knowledge scores per group across the intervention period (Mean, 95% CI)

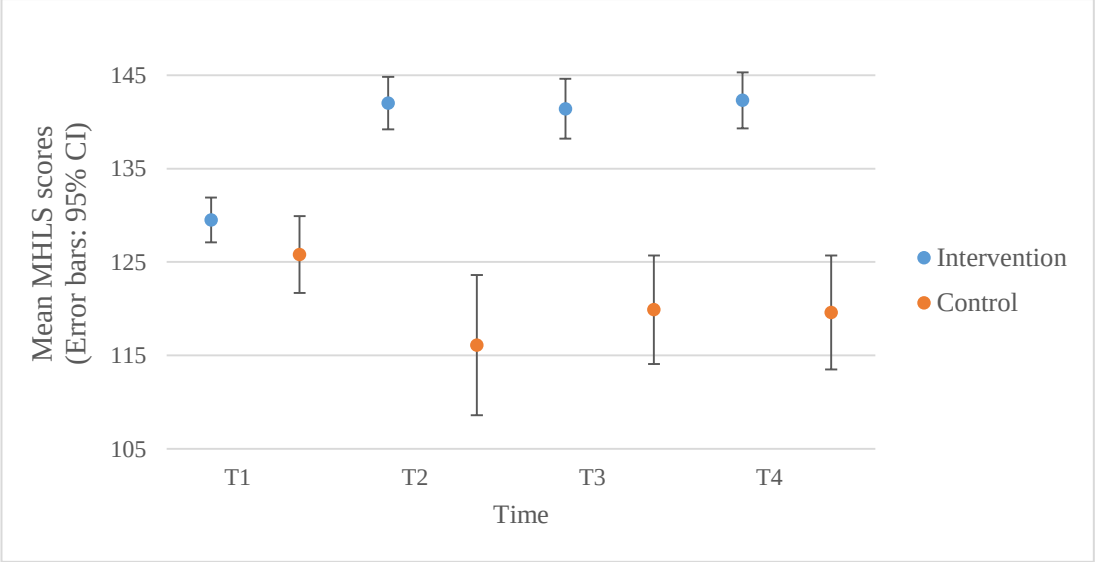
MHLS Attitude scores in the intervention group significantly increased from T1 to T2 (P<0.001; d=0.7), T1 to T3 (P<0.001; d=0.6) and T1 to T4 (P<0.001; d=0.8) (Table 7.7). MHLS Attitude scores in the intervention group were not significantly different between T2, T3 and T4 (P>0.05). For the control group, MHLS Attitude scores significantly decreased from T1 to T2 (P<0.001; d=0.5), T1 to T3 (P<0.001; d=0.4) and T1 to T4 (P<0.001; d=0.4) (Table 7.7). Significant differences were evident in MHLS Attitude scores between the intervention and control group at T2 (P<0.001; d=1.1), T3 (P<0.001; d=1.0) and T4 (P<0.001; d=1.1) (Figure 7.6).



Note: T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; MHLS=Mental Health Literacy Scale

Figure 7.6 MHLS Attitude scores per group across the intervention period (Mean, 95% CI)

In the intervention group, MHLS scores significantly increased from T1 to T2 (P<0.001; d=1.1), T1 to T3 (P<0.001; d=1.0) and T1 to T4 (P<0.001; d=1.1) (Table 7.7). MHLS scores in the intervention group were not significantly different between T2, T3 and T4 (P>0.05). For the control group, MHLS scores significantly decreased from T1 to T2 (P<0.001; d=0.4), T1 to T3 (P=0.001; d=0.3) and T1 to T4 (P<0.001; d=0.3) (Table 7.7). Significant differences were evident in MHLS scores between the intervention and control group at T2 (P<0.001; d=1.3), T3 (P<0.001; d=1.2) and T4 (P<0.001; d=1.3) (Figure 7.7).



Note: T1=baseline; T2=immediately post-intervention; T3=1-week post-intervention; T4=1-month post-intervention; MHLS=Mental Health Literacy Scale

Figure 7.7 MHLS scores per group across the intervention period (Mean, 95% CI)

7.4.3. Participant feedback

Participants positively rated the 'GAA Mental Health – Injury and a Healthy Mind' MHL educational programme, with an overall mean score of 3.6 out of a possible 4.0 (Table 7.8). Positive feedback was received, with participants stating that they liked that the programme was informative, specific to Gaelic football, well communicated, relevant, interesting, clear and concise, addressed mental health as an important topic, available online and provided additional online resources (Table 7.9). The majority of participants (N=38) stated there were no elements of the programme they disliked or would change. However, some participants (N=12) reported they disliked the repetitiveness of the written measures and would like more concise surveys. In addition, four participants reported the MHL educational programme was lacking detail and in particular, was too simplified, was only delivered on one occasion, provided no new information that was not already known and more in depth psychology detail was necessary. When asked about necessary changes, a small number of participants acknowledged the need for greater interaction during the presentation (N=3), access to a recorded version of the presentation (N=2) and more detailed information (N=4). Participants reported the additional information pack received post-presentation was helpful and in particular, was

informative (N=25), a useful reminder and reference tool (N=17) and was clear and concise (N=3).

Table 7.8 Mean ± SD participant process evaluation feedback scores

	M (SD)
How satisfied were you with the content of the presentation?	3.7 (0.5)
How helpful do you think the content of the presentation was?	3.6 (0.6)
How relevant do you think the content of the presentation was?	3.7 (0.5)
Overall, how much did you enjoy the presentation?	3.5 (0.7)
Overall, how much did you learn from the presentation?	3.3 (0.7)
Overall, the presenter knew the content well and communicated it clearly.	3.8 (0.4)
How important do you think the content of the presentation was?	3.7 (0.5)
Overall, how easy was the content of the presentation to understand?	3.7 (0.5)
Overall, how likely are you to recommend this presentation to a friend?	3.6 (0.7)
Total	**3.6 (0.5)**

Note: M=mean score; SD=standard deviation

Table 7.9 Feedback received from participants who received the 'GAA Mental Health – Injury and a Healthy Mind' MHL educational programme

Positive feedback (No. of responses)	Example of participant response
Informative (22)	*Really informative and helped me to understand my mental health and what I need to do to look after it.*
Specific to Gaelic football (10)	*Pictures and examples all specific to Gaelic football so I really can relate to the content.*
Well communicated (9)	*Very easy to follow and very well structured.*
Relevant (9)	*It was very relevant to some of the specific environments and stigmas around GAA.*
Addressed mental health as an important topic (8)	*It's shining a light on the issue of mental health within a sporting environment- which is something that is not discussed nearly enough in my sporting circles. Unfortunately it is still very much a taboo subject.*
Interesting (5)	*The presentation was engaging and interesting.*
Clear and concise (5)	*Direct, to the point, not convoluted or over complicated.*
Available online (1)	*I liked that it was online via zoom as I would have been less willing to attend a face to face information session.*
Availability of additional online resources (1)	*The post talk information tool kit pack received after the talk was a great idea to be able to refresh the information received during the presentation.*

7.5 Discussion

The current study aimed to design a novel educational intervention programme for improving MHL in Gaelic footballers and examine its effectiveness. As hypothesised, the 'GAA Mental Health – Injury and a Healthy Mind' MHL educational programme was effective in decreasing mental health stigma, improving attitudes to help-seeking and increasing the recognition and knowledge of mental health issues when compared to a control group, with changes sustained at 1-week and 1-month follow-up.

7.5.1. Stigma

The MHL educational programme successfully decreased the stigma associated with seeking and receiving psychological help from baseline to post-intervention, which was retained at 1-week and 1-month post. Previous research has similarly identified that a brief internet-based mental health and destigmatising intervention significantly reduced depression and anxiety stigma in elite athletes (Gulliver et al., 2012b). In addition, stigma was significantly improved in collegiate athletes (Chow et al., 2020; Breslin et al., 2018; Kern et al., 2017), sports coaches (Breslin et al., 2017a) and sport club leaders (Bapat et al., 2009) following an educational mental health programme, with collegiate athletes more likely to engage with and offer support to those with a mental health issue post-intervention (Breslin et al., 2018). The reduction of stigma in Gaelic footballers was retained at 1-month follow-up, which was not evident (Chow et al., 2020) or not measured and reported in previous studies (Breslin et al., 2018; Breslin et al., 2017a; Bapat et al., 2009).

Mental health help-seeking can be stigmatised, with players displaying a reluctance to seek psychological help due to socially driven stigmatising beliefs and the perception that help-seeking is not normal (Smith, 2007). Self-stigma can represent feelings of inadequacy, embarrassment and inferiority when seeking help (Chow et al., 2020). Stigma may be heightened in an athletic setting (Leimer et al., 2014) and athletes' mental health is often framed using language consistent with mental illness (Hughes and Leavey, 2012). Stigma is perceived as a key barrier to help-seeking in Gaelic footballers and thus, players need to be comfortable in their environment, where they are free to ask for help without judgement and negative consequences and will receive the necessary assistance from expert mental health professionals (Bauman, 2016). The current findings provide evidence for the implementation of a brief MHL educational programme to reduce the

stigma associated with help-seeking. The intervention aimed to normalise mental health and help-seeking by debunking common myths and misconceptions about mental health issues and providing the perspective of elite players. The utilisation of athlete role models to convey de-stigmatising information, address stereotypes (Breslin et al., 2017b) and champion awareness messages (Thornicroft et al., 2016), proved to be beneficial in normalising the conversation around mental health help-seeking, eliciting effective changes in stigma perceived by Gaelic footballers. In addition, the use of videos from elite Gaelic footballers provided vicarious reinforcement for players (Sebbens et al., 2016) and facilitated learning through observation. By reducing stigma and creating a healthy mental health culture advocating for mental wellbeing and mental health help-seeking, Gaelic footballers may be better equipped to manage stressors and deal with injury.

Significant differences were evident in SSRPH and SSOSH scores at baseline between the intervention and control group. With the quasi-experimental design in the current study, intervention group participants were recruited first, followed by control group participants. Despite no significant differences in participant characteristics (age, gender, education level, playing level, Gaelic football experience and injury history) at baseline, those who initially signed up may have been more willing to be involved, due to prior experience of or exposure to those with mental health issues, which may explain the lower stigma scores in the intervention group. However, the self-stigma associated with seeking psychological help among Gaelic footballers in the intervention group at baseline (M=23.9) was lower than levels previously observed in collegiate athletes (M=25.1-26.4) (Chow et al., 2020; Bird et al., 2018; Wahto et al., 2016), while the control group had significantly greater SSOSH scores (M=27.2). Self-stigma scores were also lower in Gaelic footballers at 1-month follow-up (M=19.9), compared to a similar follow-up in collegiate athletes who completed a MHL programme (M=23.1) (Chow et al., 2020). In addition, the perceived stigma for receiving psychological help in Gaelic footballers at baseline (M=6.1) was similar to levels observed previously in collegiate athletes (M=6.1) (Wahto et al., 2016), but the control group had greater SSRPH scores (M=7.4).

7.5.2. Attitudes

ATSPPH-SF scores indicate attitudes to help-seeking significantly improved among participants who attended the educational intervention programme, with differences

sustained at 1-week and 1-month. The attitudes subscale of MHLS also indicated significant improvements in attitudes that promote the recognition of appropriate help-seeking in the intervention group and improvements were sustained at follow-up. These findings are in line with previous research, which identified significant increases in attitudes to seeking help following a 4-week educational programme in collegiate athletes (Chow et al., 2020), while a 1-hour combined contact and education-based intervention programme increased collegiate athletes' likelihood of seeking help for a mental health issue (Kern et al., 2017). The brevity of the current intervention and that utilised by Kern et al. (2017), indicate extensive MHL programmes may not be necessary as brief, short-duration interventions elicit similar effects as longer interventions.

MHL and destigmatising internet-based interventions have previously failed to produce significant changes in help-seeking attitudes, but sample sizes were small, which may have limited the findings (Gulliver et al., 2012b). Improving visibility can improve overall attitudes towards mental health issues (Corrigan, 2005), while greater help-seeking attitudes positively predict intentions to seek help (Vogel et al., 2007b). Exposing Gaelic footballers to a mental health MHL educational programme may have provided that visibility needed to improve attitudes to seeking help. The direct references to and examples of the mental health experiences of Gaelic footballers may have allowed participants to relate to the content, eliciting significant improvements in their attitudes towards seeking help. The lack of exposure and visibility experienced by the control group may explain the significant decreases in attitudes observed from baseline to follow-up. Therefore, a sports-specific educational intervention programme may increase attitudes to help-seeking and is an essential step to prepare Gaelic footballers to effectively manage mental health issues.

Baseline attitudes to seeking help were lower in the current study in both the intervention (M=20.1) and control group (M=18.5) compared to pre-intervention attitude scores in collegiate athletes (M=27.5) (Chow et al., 2020), indicating Gaelic footballers may have poorer attitudes to help-seeking. Irish elite athletes have previously reported a willingness to seek sport psychology consulting when dealing with injury/rehabilitation (Woods et al., 2015) and have a positive attitude toward sport psychology consulting (Lavallee et al., 2005). The conflicting findings may be due to differences in attitudes between mental health help-seeking and sport psychology consulting for physical performance benefits,

with a preference for seeking help when the benefits are more readily perceived as directly related to enhancing performance (Woods et al., 2015). In addition, differences may be evident between cohorts of elite athletes, where professional sports may have greater access to mental health professionals than quasi-professional Gaelic footballers, where help-seeking may be more accepted and athletes have better attitudes towards seeking help. However, the current educational intervention programme elicited greater attitudes to help-seeking post-intervention (M=23.8) compared to a MHL and destigmatisation programme (M=22.4) (Gulliver et al., 2012b), indicating improved help-seeking attitudes in Gaelic footballers may be facilitated with an appropriate MHL intervention programme.

7.5.3. Knowledge and recognition

The educational intervention programme significantly improved the recognition of mental health disorders, with increases sustained at 1-week and 1-month follow-up. In addition, knowledge of where to seek information, risk factors and causes of mental health issues and self-treatment and professional help strategies available significantly improved in those who attended the MHL educational programme. Previous research has also shown significant improvements in MHL in collegiate athletes (Chow et al., 2020; Breslin et al., 2018; Kern et al., 2017; Van Raalte et al., 2015), elite coaches and support staff (Sebbens et al., 2016) and youth players and coaches (Bapat et al., 2009). Higher MHL indicates greater intentions to seek help (Smith and Shochet, 2011) and with lack of knowledge of mental disorders and their symptoms and poor awareness of help-seeking services previously acknowledged as key barriers to help-seeking among Gaelic footballers, the findings indicate the importance of a MHL education programme for players.

Baseline MHL scores were greater in the intervention (M=129.5) and control group (M=125.8), compared to MHL levels in student athletes (M=123.4) (Chow et al., 2020), sports coaches (M=123.1) (Gorczynski et al., 2020b) and university students (M=113.1-127.4) (Clough et al., 2019; Gorczynski et al., 2017; O'Connor and Casey, 2015). Interestingly, MHL significantly decreased in the control group from baseline to immediately post-intervention and 1-week and 1-month follow-up, while the attitudes subscale also showed decreases across all time points. The differences suggest fluctuations in MHL are evident across a period of time and MHL may be affected by

experiences of daily living. Despite recorded differences and increases in MHL between follow-up periods, MHL in the control group was significantly lower than improved levels observed in the intervention group following the MHL educational programme. Therefore, the effective changes in MHL elicited through the current educational intervention programme highlights the need to implement such programmes across all Gaelic footballers to facilitate mental health help-seeking.

Improving MHL can not only be beneficial for developing and using knowledge to improve overall mental wellbeing but can also change attitudes, help overcome stigma and create opportunities to seek help (Gorczynski et al., 2020a). In particular, those with greater mental health knowledge have lower stigmatising beliefs, improved attitudes towards mental health issues and treatment options (Jung et al., 2016) and greater intentions to engage with those with a mental health issue (Breslin et al., 2019a). MHL interventions can also assume a transfer of benefits, whereby intervention participants transfer newly acquired knowledge or helping behaviours to others with whom they associate, such as family, friends and social networks (Sebbens et al., 2016; Andersen and Pierce, 2012). Organised sports can be a promising avenue for mental health promotion (Vella et al., 2018) and provide an environment conducive to mental health education, where teammates look out for and support one another on the field, a concept which can be extended off the field, to facilitate and support mental wellbeing among players (Liddle et al., 2019). Improving MHL in the community and through Gaelic football, the most popular participatory and spectator sport in Ireland (Reilly et al., 2015), is a key means of facilitating mental health help-seeking and enables those players to assist others in need (Kelly et al., 2007). Overall, MHL educational programmes allow for the creation of collective and sustainable approaches for individual players and teams (Gorczynski et al., 2020b). Therefore, mental health and wellbeing MHL educational programmes in sport should be seen as an essential component of athlete care for the safeguarding of players (Breslin et al., 2017a) and important stakeholders, like the GAA and LGFA, must consider the provision of additional resources and research funding to support the evaluation and implementation of mental health programmes for all players across the organisations, similar to supports provided for physical health issues (Purcell et al., 2019).

7.6 Strengths and Limitations

Qualitative feedback indicated participants positively rated the MHL educational programme, which was deemed to be informative, well communicated, relevant, interesting, clear and concise. Participants also appraised the design of the project and the specific Gaelic football content and acknowledged the MHL educational programme addressed mental health, an important topic needing more attention and discussion in Gaelic football environments. In addition, the programme was underpinned by an appropriate theoretical framework, addressed all domains of MHL, utilised valid and reliable psychometric measures to assess changes in MHL and recruited a large sample size and a control group, which were issues identified with previous interventions (Breslin et al., 2017b; Kutcher et al., 2015).

The study adopted a quasi-experimental design, as a randomised controlled trial was not feasible, which may have resulted in unobserved and potentially confounding variables between groups attributed to lack of random assignment (Coleman, 2018). However, a quasi-experimental design is more robust than a single group pre-post design and was deemed most appropriate. Participants' previous mental health training or education was not measured. In addition, self-selection bias may have had an effect, where Gaelic footballers with a greater interest and commitment to learning about mental health issues or those with a past experience of mental health difficulties may have been more willing to participate. The effects of selection bias may be minimised in future research by utilising multiple recruitment strategies within elite and sub-elite structures and prior education must be measured and accounted for.

The MHL educational programme focused on two common mental disorders (depression and anxiety) and two professional help strategies (CBT and mindfulness). The limitations were necessary given the time constraints of a brief MHL educational programme. An additional noteworthy limitation is the non-measurement of help-seeking intentions. Measurement of help-seeking stigma, attitudes to seeking help and MHL (recognition, knowledge and attitudes) were deemed most appropriate and prioritised pre- and post-intervention. In addition, follow-up was only completed over a four-week period, which does not examine the long term implications and sustained benefits of the programme. Future research may consider the delivery of a more extensive programme and the inclusion of a longer follow-up period. Future research may also consider longitudinal

studies to examine actual help-seeking behaviours post-intervention. The intervention did not address the cost of services and financial support as an access barrier and facilitator, which were identified in Chapter 6, and thus, may be an additional limitation of the current research. However, improving access to services is beyond the control of this research and must be facilitated through organisational change within the GAA and LGFA.

7.7 Conclusion and Summary

The 'GAA and Mental Health – Injury and a Healthy Mind' educational programme, a brief, accessible, structured and targeted programme, designed specifically for Gaelic footballers, may be a practical and viable approach for eliciting effective changes in MHL. The findings suggest the programme is beneficial in improving Gaelic footballers' recognition of mental health issues, knowledge of help-seeking resources and attitudes to help-seeking, while also reducing the stigma associated with seeking help. The short duration of the programme may have been particularly advantageous due to the unique context of Gaelic football in Irish society. Players must balance the demands of Gaelic football participation, while simultaneously balancing their professional and personal lives (Kelly et al., 2018), leaving limited time for participation in extensive mental health programmes. In addition, the delivery of the intervention online maximised the potential for the intervention to reach a broad range of players in a manner that is cost-effective and inclusive of participants regardless of geographical location (Gulliver et al., 2012b). The positive feedback from participants indicates their satisfaction with the programme and highlights the viability in the application of an MHL educational programme to Gaelic footballers. By increasing MHL, education, stigma and attitudes to seeking help may be improved and their influence in inhibiting help-seeking in Gaelic footballers following injury may be reduced. Therefore, Gaelic footballers may be better equipped to manage their mental health and cope with stressors that can exacerbate mental health issues, leading to improved health outcomes and overall mental wellbeing of Gaelic footballers.

Mental health should be considered on a larger organisation level within the GAA and LGFA to effectively implement change. Appropriate strategic planning within the organisations should consider a thorough analysis and examination of the current state of

mental health symptoms and disorders among players, coaches and support staff, while preparing clear objectives and an action plan to effectively optimise players' mental health (Gorczynski et al., 2020a). Future research should consider the delivery of MHL educational programmes to athletes, coaches and support staff in order to create a culture that accepts and acknowledges the mental health and wellbeing of all stakeholders (Purcell et al., 2019) and normalises the discussion around mental health in Gaelic football.

Chapter 8. Thesis Summary, Conclusions and Directions for Future Research

8.1 Thesis Summary

A review of current literature conducted in **Chapter 2** highlighted injuries are common in Gaelic football but a current dearth of research identifying the incidence of injury in youth Gaelic footballers is evident. To date only two studies examining injuries in youth Gaelic footballers have been conducted (O'Connor et al., 2016a; Watson, 1996). However, with one study conducted over 20 years ago, the applicability of those findings to current Gaelic footballers is questionable, with development evident in the popularity and intensity of the game. In addition, previous research in youth Gaelic footballers has focused on older adolescents playing at under-16 and under-18 levels, with players under-14 not previously examined. The prevalence of youth Gaelic players playing multiple sports and for multiple teams simultaneously highlights the additional need to identify the association between load and injury. Thus study 1 aimed to examine the epidemiology of injury in male adolescent Gaelic footballers (**Chapter 3**) and its association with load (**Chapter 4**). Injuries were prevalent, with 20.6% of adolescent Gaelic footballers sustaining an injury during the season and 21.4 injuries occurring per 1000 participation hours. Injuries were mostly acute, new occurrences and primarily occurred in the mid-to-late season. Match injuries were significantly more common than training injuries, while injuries to the lower extremity, particularly in the hamstring and ankle, were commonly recorded. Hand and finger injuries were also commonly noted and sprains and strains were the most common specific nature of the injuries recorded. Sprinting was the most prevalent mechanism of injury and injuries were primarily evident during the second half of matches.

Periodic variations in load were evident across the season, while excessive weekly load, monotony and absolute change significantly increased the risk of sustaining an injury. Internal load measures (monotony, strain and absolute change) were associated with injury in male adolescent Gaelic footballers. However, high specificity and low sensitivity indicate internal load measures may be clinically beneficial for identifying players not at risk of sustaining an injury who may not require load modifications. The findings also suggest injury risk may be affected by additional intrinsic and extrinsic factors and effective monitoring may require a combination of load monitoring measures to assess this risk. Weekly loads recorded in male adolescent Gaelic footballers were lower than previously recorded in adult Gaelic footballers, as expected in younger players who may have an increased risk of injury due to anatomical and pubertal differences. The

key message highlighted in chapter 4 outlines the importance of prioritising load monitoring among adolescent athletes but key to effective monitoring is open communication and identifying which stakeholder is responsible for identifying when decreases in load are necessary.

An additional aim of study 1 (**Chapter 5**) was to examine the psychological response and effect of psychosocial factors on injury, particularly fear-avoidance and psychological readiness to return to sport. Fear-avoidance was evident following injury, which decreased prior to returning to play post-injury. Levels of fear-avoidance in male adolescent Gaelic footballers were comparable to levels experienced by collegiate and adult athletes. Pain moderated the psychosocial injury response, where those with greater pain reported greater fear-avoidance. Time-loss also moderated the response, as players experiencing a time-loss injury reported greater fear-avoidance related to not being able to play the same as before their injury, not being aware what the injury is and not knowing if they are ready to play when compared to those with a non-time-loss injury. Injury severity and time-loss duration were not significant predictors of fear-avoidance post-injury and baseline fear-avoidance did not predict those at risk of experiencing an injury during the season. Among those who sustained a time-loss injury, fear-avoidance levels reduced from post-injury to prior to return to play but psychological readiness and confidence to return to play was poor.

Study 1 highlighted the prevalence of negative psychological responses to injury in male adolescent Gaelic footballers. However, the peak onset of mental health issues in young people is during late adolescence and early adulthood (Rice et al., 2016), which coincides with the peak period of Gaelic football participation. With injury perceived as a significant stressor that can initiate or exacerbate mental health issues (Gouttebarge et al., 2016) and given the prevalence of injury in Gaelic football (O'Connor et al., 2020; Roe et al., 2018a; O'Connor et al., 2017; Murphy et al., 2012; Newell et al., 2006; Cromwell et al., 2000), an understanding of the psychological response to injury in adult Gaelic footballers is necessary. However, the experience of mental health issues is not equivalent to the rate of help-seeking (Rickwood and Thomas, 2012) and athletes often do not seek help (Gorczynski et al., 2019). Therefore, study 2 **(Chapter 6)** aimed to examine the barriers and facilitators to professional mental health help-seeking post-injury in male and female elite and sub-elite Gaelic footballers.

As highlighted in study 2, education, the perception, attitude and actions of others, attitudes to seeking help, accessibility and characteristics of the help-provider were key barriers and facilitators to mental health help-seeking in Gaelic footballers. In particular, poor awareness of help-seeking services and lack of knowledge of the symptoms of mental health issues were acknowledged, while stigma from teammates and the coach/management was an important barrier perceived by elite and sub-elite players. Negative attitudes, including the perception that help is not necessary or the player can manage their issues on their own was reported by Gaelic footballers and access to help-seeking services was perceived to be limited by the cost of services. Sub-elite Gaelic footballers also acknowledged characteristics of the help-provider as a barrier to seeking help. In contrast, help-seeking was perceived by elite and sub-elite players to be facilitated by an awareness of services, an understanding of mental disorders and their symptoms and awareness of others who have experienced mental health issues. Social support and normalising help-seeking were also reported to aid help-seeking. Financial support and convenience of access were acknowledged as important accessibility factors. Differences in perceived barriers and facilitators were evident between male and female Gaelic footballers. Elite female players acknowledged stigma from family, feelings of embarrassment and lack of time as additional barriers to help-seeking, while access to online resources was a noted facilitator. Sub-elite female players also noted embarrassment as a barrier, while not knowing the benefits and what to expect in an appointment with a professional and feeling it is better to manage on your own were barriers acknowledged among male sub-elite Gaelic footballers.

Improving MHL in Gaelic footballers may be beneficial in reducing the barriers to help-seeking perceived by elite and sub-elite Gaelic footballers. Thus, the aim of study 3 **(Chapter 7)** was to design and implement a novel educational MHL intervention programme for Gaelic footballers. The novel educational programme was designed in collaboration with a multi-disciplinary group of experts and was specific to Gaelic football. As highlighted in study 3, the 'GAA – Injury and a Healthy Mind' educational intervention programme effectively reduced stigma, improved attitudes to help-seeking and increased knowledge and recognition of mental health issues among Gaelic footballers in the intervention group.

8.2 Thesis Conclusions and Practical Implications

The current research highlights meaningful findings in relation to injuries, load and post-injury psychological responses in adolescent Gaelic footballers. In addition, the research identifies barriers and facilitators to mental health help-seeking following injury and demonstrates the effectiveness of a MHL educational intervention programme for Gaelic footballers. A number of noteworthy conclusions and practical implications are evident.

The prevalence of injury identified in male adolescent Gaelic footballers highlights the need for comprehensive and effective injury prevention initiatives to reduce injury incidence, which may be beneficial in minimising player attrition, improving team success and promoting life-long participation. Design of appropriate strategies must consider the context the intervention will be implemented, be conscious of the effects of risk-taking behaviour and compliance and evaluate the effectiveness of the intervention before wide scale implementation (Van Tiggelen et al., 2008; Finch, 2006). Injury prevention interventions may be facilitated in the school setting through physical education classes, as school attendance is mandatory and allows for accessibility, which reduces the bias for adolescents not involved within community sports.

Load monitoring may also be beneficial in reducing the occurrence of injury and the findings highlight the need for open communication between players, coaches, parents and sports medicine clinicians across all sports to avoid the application of excessive or sudden changes in weekly load to adolescents. Ongoing interaction and open communication between all stakeholders to mitigate players' injury risk is key to effective load monitoring and is essential in young athletes due to the prevalence of adolescents participating across multiple sports and age grades in community and school settings. Successful prevention of injury in adolescent Gaelic footballers may not be facilitated without such communication and is a key take home message from the current research.

The levels of fear-avoidance evident in adolescent Gaelic footballers post-injury also highlights the importance of psychological rehabilitation in conjunction with physical rehabilitation. Awareness of the extent of fear-avoidance in injured players allows clinicians to design an effective rehabilitation plan that can manage both the physical and psychological recovery required and may consequently reduce the period of time loss from sports participation. Considerations for improving confidence are also

recommended to aid players' psychological readiness to return to Gaelic football post-injury. Psychological rehabilitation and equipping adolescent athletes with necessary skills that can enhance their mental health may be beneficial in a sporting context but may also have longer term benefits on health and wellbeing within adolescents' everyday environment.

Mental health issues are common in adult Gaelic footballers following injury but professional help-seeking is not prevalent. Barriers and facilitators to mental health help-seeking post-injury in elite and sub-elite Gaelic footballers were presented. The findings identify the need for increased awareness of mental health issues and help-seeking services, normalising help-seeking and reducing stigma, improving help-seeking attitudes and increasing access to services. By facilitating mental health help-seeking, players' emotional well-being and overall mental health may be sustained, where Gaelic footballers may be better equipped to psychologically manage their injury and successful rehabilitation and return to play may be supported. The novel MHL educational intervention programme effectively increased Gaelic footballers' recognition of mental health issues, knowledge of help-seeking resources and attitudes to help-seeking, while also reducing the stigma associated with seeking help. Therefore, Gaelic footballers may be better equipped to manage their mental health when injured and cope with stressors that can exacerbate mental health issues. Improving MHL and equipping Gaelic footballers with the necessary mental health skills and knowledge may lead to improved health outcomes and enhance the overall mental wellbeing of Gaelic footballers.

8.3 Thesis Limitations

The findings from this research must be viewed in light of a number of limitations.

- Data collection for study 1, as detailed in **Chapter 3, Chapter 4** and **Chapter 5,** was conducted in urban and rural Gaelic football settings in Westmeath, indicating the findings may not be generalisable to other populations in different geographic or socioeconomic settings. In addition, study 1 solely examined male adolescent Gaelic footballers making it difficult to apply the findings to adult or female players.
- The accuracy of sRPE as a measure of internal load in **Chapter 4** is a possible limitation of this research. sRPE was measured for each session completed using

a weekly training diary but is recommended to be measured within 30 minutes post-session (Comyns and Flanagan, 2013). Research suggests the measurement may remain accurate up to 48 hours post-session (Fanchini et al., 2017) but may not be reliable beyond that time period (Scantlebury et al., 2018; Phibbs et al., 2017). Consideration for the use of app-based technologies in future research may be appropriate to reduce the effects of this limitation.

- A low number of time-loss injuries were recorded in study 1 (**Chapter 3, Chapter 4** and **Chapter 5**), making it difficult to interpret findings related to time-loss and examine the true relationship between time-loss, fear-avoidance and psychological readiness to return to play post-injury. The low number of time-loss injuries may be attributed to the short season duration. The effects of this limitation may be reduced by examining injuries over a longer season and in a larger cohort of players.
- In study 1 (**Chapter 3, Chapter 4** and **Chapter 5**), injury history was limited to injuries sustained over the previous 12 months. However, this short duration may not account for injuries that have prolonged effects on physical and psychological health (e.g. ACL injury that requires greater than 12 months of missed time from play). In study 2 **(Chapter 6)** and study 3 **(Chapter 7)**, injury history duration was increased to three years to account for this but may introduce issues of recall bias.
- Study 2 **(Chapter 6)** involved qualitative research, which may be associated with unique limitations. Data collection and interpretation may be influenced by a review of the literature pertaining to the area of research, as the researcher is sensitised to findings they may expect to find (Campbell, 2009). However, the voluntary nature of the discussion can allow participants to discuss factors perceived to be relevant, rather than what the researcher thinks is important. In addition, with focus groups, interaction of all participants may be limited, where one more dominant participant controls the discussion. Reluctance to be actively involved in the discussion may have been emphasised in the current research as mental health can be perceived as a sensitive topic (Breslin et al., 2019b).
- In the examination of barriers and facilitators to help-seeking following injury in study 2 **(Chapter 6)**, participants were not currently injured, which may have limited responses. However, a history of injury was required to ensure participants

had a shared understanding of an injury experience. In addition, the focus on help-seeking following injury does not consider broader-level cultural factors influencing help-seeking when experiencing mental health issues not initiated or exacerbated by injury.

- A risk of bias may be evident as a limitation in study 3 **(Chapter 7)**, where Gaelic footballers with a greater interest and commitment to learning about mental health issues or those with a past experience of mental health difficulties may have been more willing to participate. Therefore, the findings may not provide an accurate representation for all Gaelic footballers. In addition, a randomised controlled trial was not feasible and the lack of random group assignment may have added to issues of bias.
- The intervention implemented in study 3 **(Chapter 7)** did not address all perceived barriers and facilitators to help-seeking identified in **Chapter 6**, namely, the accessibility of help-seeking services. Improving access to services (i.e., providing financial support) was beyond the control of the current research and would need to be considered by policy makers at the organisational level within the GAA and LGFA. In addition, due to time constraints, the MHL educational programme focused on two common mental disorders (depression and anxiety) and two professional help strategies (CBT and mindfulness), which may have limited the scope of mental health knowledge acquired by participants in the intervention group.
- In **Chapter 7,** the intervention failed to measure Gaelic footballers actual mental health help-seeking behaviours after attending the 'GAA Mental Health – Injury and a Healthy Mind' educational intervention programme.

8.4 Directions for Future Research

This project examined the psychology of injury in Gaelic football but further research is necessary in relation to the epidemiology of injury, load monitoring, psychosocial post-injury responses and mental health help-seeking.

8.4.1. Epidemiology of injury

- Extensive epidemiological studies need to be conducted examining injury occurrence in larger samples and across multiple seasons to have a true depiction of the injury problem in adolescent Gaelic football.

- Injury prevention initiatives addressing the common injuries identified in adolescent Gaelic footballers are necessary, with a focus on hamstring, ankle, hand and fingers injuries and the injuries elicited through sprinting.
- Extensive examination of the epidemiology of injury in female adolescent and adult Gaelic footballers is necessary to examine the incidence and prevalence of injury and to facilitate comparisons between male and female Gaelic football participants.

8.4.2. Load monitoring

- Large-scale load monitoring in adolescents should be considered across a number of sports simultaneously to examine the association between load and injury individually for each sport and with multiple sport participation, which is prevalent in adolescents.
- Load monitoring should be completed using multiple internal and external measures to examine the physiological and subjective demands of sport participation on adolescents.

8.4.3. Psychosocial response to injury

- Fear-avoidance and the psychological response to musculoskeletal injury should be examined across a number of seasons and in diverse Gaelic football populations, including adolescent, adult, male and female players.
- Examination of time-loss injuries across a larger cohort or during multiple seasons may allow for further examination of fear-avoidance and psychological readiness to return to play following injury.

8.4.4. Mental health help-seeking

- Subsequent or repeated examination of the barriers and facilitators to mental health help-seeking following injury needs to be considered as additional barriers may arise or help-seeking may be facilitated by varying factors arising due to socioeconomic, cultural and organisational changes.
- Consideration for barriers and facilitators that may influence help-seeking not just when a player is injured are important and should be considered in future research to effectively aid players' management of mental health.

8.4.5. MHL

- Future research should consider the utilisation of a randomised controlled trial when implementing a MHL intervention in Gaelic footballers to minimise selection bias, which may be facilitated through multiple and comprehensive recruitment strategies.
- MHL interventions must also consider the effect of intervention content on actual help-seeking behaviours. This may be facilitated by tracking participants across a season or number of seasons and examining if actual help-seeking behaviours improve when compared to a control.
- Despite the benefits evident with a brief MHL educational programme, considerations for more extensive programmes addressing multiple mental disorders, in addition to anxiety and depression presented in the current study, and treatment approaches available in conjunction with CBT and mindfulness.
- Longer follow-up periods should be utilised in future research to examine the long-term sustained benefits of participation in the 'GAA and Mental Health – Injury and a Healthy Mind' educational programme.
- Future research should consider MHL interventions for Gaelic football coaches to support players' mental health. Previous research shows by improving knowledge, competence and beliefs, Gaelic games coaches may provide an alternative and informal source of initial support to young people (Duffy et al., 2019), which may also be beneficial in normalising mental health issues and help-seeking.

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Appendices

Appendix A- Peer Reviewed Publications

O'Keeffe, S., Ní Chéilleachair, N., O'Connor, S. (2020). Fear-Avoidance Following Musculoskeletal Injury in Male Adolescent Gaelic Footballers. *Journal of Sport Rehabilitation*. 29(4), pp.413-419. DOI: 10.1123/jsr.2018-0258

J Sport Rehabil. 2019 Mar 12:1-24. doi: 10.1123/jsr.2018-0258. [Epub ahead of print]

Fear-Avoidance Following Musculoskeletal Injury in Male Adolescent Gaelic Footballers.

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Abstract

CONTEXT:: Gaelic football participation provides a wealth of benefits but a risk of musculoskeletal injury also exists. Injury is associated with physical consequences, including pain, discomfort, loss of function, time absent from school/sport, considerable medical expenses along with placing undue pressure on emergency services and hospital staff. Concurrent psychological consequences, such as fear-avoidance, can also occur causing psychological distress. There is a current dearth of available research examining the psychology of injury in male adolescent Gaelic footballers.

OBJECTIVE:: To examine fear-avoidance post-injury in male adolescent Gaelic footballers, the effect of pain, time-loss, injury severity and previous injury on the extent of fear-avoidance and the usefulness of a modified Athlete Fear Avoidance Questionnaire (mAFAQ) as a screening tool for predicting injury.

DESIGN:: Prospective cohort study.

SETTING:: Recreational clubs.

PARTICIPANTS:: 97 male adolescent club Gaelic footballers (13.4±1.1 years).

INTERVENTIONS:: Musculoskeletal injuries sustained during Gaelic football participation, defined as any injury sustained during training or competition causing restricted performance or time lost from play,[1] were assessed and recorded weekly by a Certified Athletic and Rehabilitation Therapist. Injuries requiring time loss from participation were classed as time-loss injuries. Injury characteristics that included type, nature, location, severity and pain were recorded.

MAIN OUTCOME MEASURES:: Injured players completed the Athlete Fear Avoidance Questionnaire (AFAQ), a measure of injury-related fear-avoidance following injury assessment (AFAQ1). With time-loss injuries, the AFAQ was completed again (AFAQ2) prior to return to play. mAFAQ was completed at baseline.

RESULTS:: Twenty-two injuries were recorded during the season with fear-avoidance evident post-injury that significantly decreased before returning to play. Fear-avoidance post-injury was higher in those with greater pain but time-loss, injury severity and previous injury did not significantly affect the extent of fear-avoidance. Baseline fear-avoidance did not predict injury.

CONCLUSIONS:: Psychological rehabilitation is recommended for managing post-injury psychological distress in male adolescent Gaelic footballers.

KEYWORDS: Gaelic games; Psychological distress; boys; injuries; teenage

O'Keeffe, S., O'Connor, S., Ní Chéilleachair, N. (2020). Are Internal Training Load Measures Associated with Injuries in Male Adolescent Gaelic Football Players? *European Journal of Sport Science*. 20(2), pp.249-260. DOI: 10.1080/17461391.2019.1621950

Are internal load measures associated with injuries in male adolescent Gaelic football players?

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Abstract

This study aimed to examine internal loads in male adolescent Gaelic footballers and their association with musculoskeletal injury. Written training diaries were completed by 97 male adolescent Gaelic footballers weekly and injuries, defined as any injury sustained during training or competition causing restricted performance or time lost from play, were assessed by a Certified Athletic Therapist. Daily load was determined for each player (session rating of perceived exertion by session duration) and summed to give weekly load. Univariate and multiple logistic regressions were conducted to determine the association with injury. Twenty-two injuries were recorded with match injuries significantly more common than training injuries. Periodic variations in weekly load and injuries were evident throughout the season. Univariate analysis identified weekly load (OR = 2.75; 95%CI = 1.00–7.59), monotony (OR = 4.17; 95%CI = 1.48–11.72) and absolute change in load (OR = 3.27; 95%CI = 1.15–9.32) greater than the team average were significant injury risk factors. Multiple logistic regression with 2-weekly and 3-weekly cumulative loads, absolute change, monotony, strain, ACWR and age as independent variables identified internal load measures (monotony, strain and absolute change) were associated with injury with high specificity (96.0%) but low sensitivity (25.0%). The findings highlight the need to monitor team and individual loads to avoid sudden week-to-week changes or excessive weekly loads. Open communication between players, parents, coaches and sports medicine clinicians enables effective load monitoring that can reduce injury risk and may subsequently minimise dropout, improve team success and overall sport enjoyment and promote life-long sports participation.

Keywords: Youth, injury & prevention, team sport, overtraining, performance

Highlights

- High weekly cumulative load, high monotony and sudden changes in week-to-week load are associated with increased injury risk.
- Internal load measures are associated with injury but low sensitivity and high specificity of the model indicate internal load may not be the only predictor of injury and other intrinsic and extrinsic risk factors should be considered.
- Effective load monitoring in adolescents can only be facilitated through open communication between players, parents, coaches and sports medicine clinicians.

O'Keeffe, S., Ní Chéilleachair, N., Campbell, M., O'Connor, S. (2021). Barriers and Facilitators to Mental Health Help-Seeking in Elite Gaelic Footballers Post-Injury: A Qualitative Study. *Research Quarterly for Sport and Exercise.* Ahead of print. DOI: 10.1080/02701367.2020.1865517

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Barriers and Facilitators to Mental Health Help-Seeking in Elite Gaelic Footballers Post-Injury: A Qualitative Study

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ABSTRACT

Purpose: Injury can exacerbate mental health issues in athletes. However, the prevalence of mental health issues is not equivalent to the rate of professional help-seeking, with reluctance to seek-help acknowledged as one of the greatest obstacles in efficient management of mental health issues. The current study aimed to examine perceived barriers and facilitators to professional mental health help-seeking in elite male and female Gaelic footballers post-injury. **Methods:** Male (n = 14) and female (n = 12) elite Gaelic footballers, with a history of moderate or severe injury, were recruited to participate in a focus group. Group discussions began with a written task where participants noted perceived barriers to help-seeking followed by a group discussion of these barriers. Following discussion, participants ranked identified barriers in order of those perceived as most important in stopping a player from seeking help when experiencing mental health issues post-injury. All three tasks were repeated for help-seeking facilitators. Focus groups were audio-taped, transcribed and thematically analyzed. **Results:** Lack of education, stigma, negative attitudes to help-seeking and accessibility issues were identified as key barriers to help-seeking among elite Gaelic footballers. Education, the attitudes and actions of others and accessibility were perceived as factors facilitating help-seeking. **Conclusions:** Given the negative psychological responses that can accompany injury, there is a need for facilitation and encouragement of help-seeking among players experiencing mental health issues post-injury. Interventions for reducing the barriers to help-seeking identified in the current study are necessary.

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KEYWORDS
Education; GAA; psychology of injury; stigma

Appendix B- Fear-Avoidance Beliefs Questionnaire (FABQ)

Instructions: For each statement, please circle the number from 0 to 6 to indicate how much physical activities, such as bending, lifting, walking or driving affect or would affect *your* back pain.

		Completely Disagree			Unsure			Completely Agree
1.	My pain was caused by physical activity.	0	1	2	3	4	5	6
2.	Physical activity makes my pain worse.	0	1	2	3	4	5	6
3.	Physical activity might harm my back.	0	1	2	3	4	5	6
4.	I should not do physical activities which (might) make my pain worse.	0	1	2	3	4	5	6
5.	I cannot do physical activities which (might) make my pain worse.	0	1	2	3	4	5	6

The following statements are about how your normal work affects or would affect your back pain.

		Completely Disagree			Unsure			Completely Agree
6.	My pain was caused by my work or by an accident at work.	0	1	2	3	4	5	6
7.	My work aggravated my pain.	0	1	2	3	4	5	6
8.	I have a claim for compensation for my pain.	0	1	2	3	4	5	6
9.	My work is too heavy for me.	0	1	2	3	4	5	6
10.	My work makes or would make my pain worse.	0	1	2	3	4	5	6
11.	My work might harm my back.	0	1	2	3	4	5	6
12.	I should not do my regular work with my present pain.	0	1	2	3	4	5	6
13.	I cannot do my normal work with my present pain.	0	1	2	3	4	5	6
14.	I cannot do my normal work until my pain is treated.	0	1	2	3	4	5	6
15.	I do not think that I will be back to my normal work within 3 months.	0	1	2	3	4	5	6
16.	I do not think that I will ever be able to go back to that work.	0	1	2	3	4	5	6

Appendix C- Fear of Pain Questionnaire-III (FPQ-III)

Instructions: The items listed below describe painful experiences. Please look at each item and think about how FEARFUL you are of experiencing the PAIN associated with each item. If you have never experienced the PAIN of a particular experience, please answer on the basis of how FEARFUL you expect you would be if you had such an experience. Circle one rating per item to rate your FEAR OF PAIN in relation to each event.

AMOUNT OF FEAR

Not at All	A little	A Fair Amount	Very Much	Extreme	
1	2	3	4	5	Being in an automobile accident
1	2	3	4	5	Biting your tongue while eating
1	2	3	4	5	Breaking your arm
1	2	3	4	5	Cutting your tongue licking an envelope
1	2	3	4	5	Having a heavy object hit you in the head
1	2	3	4	5	Breaking your leg
1	2	3	4	5	Hitting a sensitive bone in your elbow-your ‘’funny bone’’
1	2	3	4	5	Having a blood sample drawn with a hypodermic needle
1	2	3	4	5	Having someone slam a heavy car door on your hand
1	2	3	4	5	Falling down a flight of concrete stairs
1	2	3	4	5	Receiving an injection in your arm
1	2	3	4	5	Burning your fingers with a match
1	2	3	4	5	Breaking your neck
1	2	3	4	5	Receiving an injection in your hip/buttocks
1	2	3	4	5	Having a deep splinter in the sole of your foot probed and removed with tweezers
1	2	3	4	5	Having an eye doctor remove a foreign particle stuck in your eye
1	2	3	4	5	Receiving an injection in your mouth
1	2	3	4	5	Being burned on your face by a lit cigarette
1	2	3	4	5	Getting a paper cut on your finger
1	2	3	4	5	Receiving stiches in your lip
1	2	3	4	5	Having a foot doctor remove a wart from your foot with a sharp instrument

1	2	3	4	5	Cutting yourself while shaving with a sharp razor
1	2	3	4	5	Gulping a hot drink before it has cooled
1	2	3	4	5	Getting strong soap in both your eyes while bathing or showering
1	2	3	4	5	Having a terminal illness that causes you daily pain
1	2	3	4	5	Having a tooth pulled
1	2	3	4	5	Vomiting repeatedly because of food poisoning
1	2	3	4	5	Having sand or dust blow into your eyes
1	2	3	4	5	Having one of your teeth drilled
1	2	3	4	5	Having a muscle cramp

Appendix D- Pain Catastrophizing Scale (PCS)

Instructions: We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

RATING	**0**	**1**	**2**	**3**	**4**
MEANING	Not at all	To a slight degree	To a moderate degree	To a great degree	All the time

When I'm in pain….

Number	**Statement**	**Rating**
1.	I worry all the time about whether the pain will end.	
2.	I feel I can't go on.	
3.	It's terrible and I think it's never going to get any better.	
4.	It's awful and I feel that it overwhelms me.	
5.	I feel I can't stand it anymore.	
6.	I become afraid that the pain will get worse.	
7.	I keep thinking of other painful events.	
8.	I anxiously want the pain to go away.	
9.	I can't seem to keep it out of my mind.	
10.	I keep thinking about how much it hurts.	
11.	I keep thinking about how badly I want the pain to stop.	
12.	There's nothing I can do to reduce the intensity of the pain.	
13.	I wonder whether something serious may happen.	

Appendix E- Profile of Mood States (POMS)

Instructions: Below is a list of words that describe feelings people have. Please **CIRCLE THE NUMBER THAT BEST DESCRIBES HOW YOU FEEL RIGHT NOW.**

	Not At All	A Little	Moderately	Quite a Lot	Extremely
Tense	0	1	2	3	4
Angry	0	1	2	3	4
Worn Out	0	1	2	3	4
Unhappy	0	1	2	3	4
Proud	0	1	2	3	4
Lively	0	1	2	3	4
Confused	0	1	2	3	4
Sad	0	1	2	3	4
Active	0	1	2	3	4
On-edge	0	1	2	3	4
Grouchy	0	1	2	3	4
Ashamed	0	1	2	3	4
Energetic	0	1	2	3	4
Hopeless	0	1	2	3	4
Uneasy	0	1	2	3	4
Restless	0	1	2	3	4
Unable to concentrate	0	1	2	3	4
Fatigued	0	1	2	3	4
Competent	0	1	2	3	4
Annoyed	0	1	2	3	4
Discouraged	0	1	2	3	4
Resentful	0	1	2	3	4
Nervous	0	1	2	3	4
Miserable	0	1	2	3	4
Confident	0	1	2	3	4
Bitter	0	1	2	3	4
Exhausted	0	1	2	3	4
Anxious	0	1	2	3	4
Helpless	0	1	2	3	4
Weary	0	1	2	3	4
Satisfied	0	1	2	3	4
Bewildered	0	1	2	3	4
Furious	0	1	2	3	4
Full of Pep	0	1	2	3	4
Worthless	0	1	2	3	4
Forgetful	0	1	2	3	4
Vigorous	0	1	2	3	4

Appendix F- Athlete Fear-Avoidance Questionnaire (AFAQ)

Instructions: We are interested in your feelings or thoughts when in pain as a result of a sport injury. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are in pain due to a sports injury.

Rating	**1**	**2**	**3**	**4**	**5**
Meaning	Not at all	To a slight degree	To a moderate degree	To a great degree	Completely agree

Statement	**Rating**
1. I will never be able to play as I did before my injury	
2. I am worried about my role with the team changing	
3. I am worried about what other people will think of me if I don't perform at the same level	
4. I am not sure what my injury is	
5. I believe that my current injury has jeopardised my future athletic abilities	
6. I am not comfortable going back to play until I am 100%	
7. People don't understand how serious my injury is	
8. I don't know if I am ready to play	
9. I worry if I go back to play too soon I will make my injury worse	
10. When my pain is worse, I worry that my injury is a very serious one	

Appendix G- Trait Sport Confidence Inventory (TSCI)

Instructions: Think about how self-confident you are when you compete in sport. Answer the questions below on how confident you *generally feel* when you compete in your sport. Compare your self-confidence to the *most self-confident* athlete you know. Please answer as you *really* feel, not how you would like to feel. Your answers will be kept completely confidential.

When you compete, how confident do you *generally* feel?

	Low			**Medium**			**High**		
Compare your confidence in *your ability to execute the skills necessary to be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence in *your ability to make critical decisions during competition* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to perform under pressure* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to execute successful strategy* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to concentrate well enough to be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to adapt to different game situations and still be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to achieve your competitive goals* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to consistently be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to think and respond successfully during competition* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to meet the challenge of competition* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to be successful even when the odds are against you* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare your confidence *in your ability to bounce back from performing poorly and be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9

Appendix H- State Sport Confidence Inventory (SSCI)

Instructions: Think about how confident you feel **right now** about performing successfully in the upcoming competition.

Answer the questions below on how confident you feel **right now** about competing in the upcoming contest. Compare your self-confidence to the *most self-confident athlete* you know.

Please answer as you *really* feel, not how you would like to feel. Your answers will be kept completely confidential.

How confident are you *right now* about competing in the upcoming contest?

	Low			**Medium**			**High**		
Compare the confidence you feel **right now** in *your ability to execute the skills necessary to be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** in *your ability to make critical decisions during competition* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** *in your ability to perform under pressure* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** *in your ability to execute successful strategy* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** *in your ability to concentrate well enough to be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** *in your ability to adapt to different competitive situations and still be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9

Compare the confidence you feel **right now** *in your ability to achieve your competitive goals* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** *in your ability to be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** in *your ability to think and respond successfully during competition* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** in *your ability to meet the challenge of competition* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** *in your ability to be successful based on your preparation for this event* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** in *your ability to perform consistently enough to be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9
Compare the confidence you feel **right now** *in your ability to bounce back from performing poorly and be successful* to the most confident athlete you know.	1	2	3	4	5	6	7	8	9

Appendix I-Tampa Scale for Kinesiophobia (TSK)

1= strongly disagree

2= disagree

3= agree

4= strongly agree

1.	I'm afraid that I might injure myself if I exercise	1	2	3	4
2.	If I were to try to overcome it, my pain would increase	1	2	3	4
3.	My body is telling me there I have something dangerously wrong	1	2	3	4
4.	My pain would probably be relieved if I were to exercise	1	2	3	4
5.	People aren't taking my medical condition seriously enough	1	2	3	4
6.	My accident has put my body at risk for the rest of my life	1	2	3	4
7.	Pain always means I have injured my body	1	2	3	4
8.	Just because something aggravates my pain does not mean it is dangerous	1	2	3	4
9.	I am afraid that I might injure myself accidently	1	2	3	4
10.	Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1	2	3	4
11.	I wouldn't have this much pain if there weren't something potentially dangerous going on in my body	1	2	3	4
12.	Although my condition is painful, I would be better off if I were physically active	1	2	3	4
13.	Pain lets me know when to stop exercising so that I don't injure myself	1	2	3	4
14.	It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15.	I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4
16.	Even though something is causing me a lot of pain, I don't think it's actually dangerous	1	2	3	4
17.	No one should have to exercise when he/she is in pain	1	2	3	4

Appendix J- Injury Psychological Readiness to Return to Sport Scale (IPRSS)

INJURY PSYCHOLOGICAL READINESS TO RETURN TO SPORT

Please rate your confidence to return to your sport on a scale from 0 to 100.

0= no confidence at all
50= moderate confidence
100= complete confidence

1. My overall confidence to play is _____
2. My confidence to play without pain is _____
3. My confidence to give 100% effort is _____
4. My confidence to not concentrate on the injury is _____
5. My confidence in the injured body part to handle to demands of the situation is _____
6. My confidence in my skill level ability is _____

Total _____

Appendix K- Anxiety Literacy Questionnaire

	True	False	Don't know
People with anxiety disorder often speak in a rambling and disjointed way.			
Being easily fatigued may be a symptom of anxiety disorder.			
Reckless and foolhardy behaviour is a common sign of anxiety disorder.			
Irritability may be a symptom of anxiety disorder.			
Bearing grudges and refusing to forgive others may be a sign of anxiety disorder.			
People with anxiety disorder often hear voices that are not there.			
Too much worry is the main symptom of anxiety disorder.			
Tense muscles may be a symptom of anxiety disorder.			
Anxiety disorder does not affect your concentration.			
Having several distinct personalities may be a sign of anxiety disorder.			
A dry mouth can be a symptom of anxiety disorder.			
The best way of dealing with anxiety disorder is to handle it yourself.			
Generalised anxiety disorder is a common cause of workplace disability.			
Generalised anxiety disorder does not run in families.			
Being bullied or victimized increases your risk of developing an anxiety disorder.			
Antidepressants are effective treatment for anxiety disorder.			
Many treatments for anxiety disorder are more effective than antidepressants.			
Acupuncture is just as effective as cognitive behavioural therapy for anxiety disorder.			
Reading self-help books about cognitive behavioural therapy is not effective for anxiety disorder.			
It's not a problem to stop taking antidepressants quickly. Antidepressants are addictive.			
Antidepressant medications usually work straight away.			

Appendix L- Depression Literacy Questionnaire

	True	False	Don't know
People with depression often speak in a rambling and disjointed way.			
People with depression may feel guilty when they are not at fault.			
Reckless and foolhardy behaviour is a common sign of depression.			
Loss of confidence and poor self-esteem may be a symptom of depression.			
Not stepping on cracks in the footpath may be a sign of depression.			
People with depression often hear voices that are not there.			
Sleeping too much or too little may be a sign of depression.			
Eating too much or losing interest in food may be a sign of depression.			
Depression does not affect your memory and concentration.			
Having several distinct personalities may be a sign of depression.			
People may move more slowly or become agitated as a result of their depression.			
Clinical psychologists can prescribe antidepressants.			
Moderate depression disrupts a person's life as much as multiple sclerosis or deafness.			
Most people with depression need to be hospitalised.			
Many famous people have suffered from depression.			
Many treatments for depression are more effective than antidepressants.			
Counselling is as effective as cognitive behavioural therapy for depression.			
Cognitive behavioural therapy is as effective as antidepressants for mild to moderate depression.			
Of all the alternative and lifestyle treatments for depression, vitamins are likely to be the most helpful.			
People with depression should stop taking antidepressants as soon as they feel better.			
Antidepressants are addictive.			
Antidepressant medications usually work straight away.			

Appendix M- Mental Health Knowledge Schedule

Instructions: For each of statements 1– 6 below, respond by ticking one box only. Mental health problems here refer, for example, to conditions for which an individual would be seen by healthcare staff.

	Agree Strongly	**Agree Slightly**	**Neither agree nor disagree**	**Disagree Slightly**	**Disagree Strongly**	**Don't know**
Most people with mental health problems want to have paid employment.						
If a friend had a mental health problem, I know what advice to give them to get professional help.						
Medication can be an effective treatment for people with mental health problems.						
Psychotherapy (e.g. counselling or talking therapy) can be an effective treatment for people with mental health problems.						
People with severe mental health problems can fully recover.						
Most people with mental health problems go to a healthcare professional to get help.						

Instructions: For items 7-12, say whether you think each condition is a type of mental illness by ticking one box only.

	Agree Strongly	**Agree Slightly**	**Neither agree nor disagree**	**Disagree Slightly**	**Disagree Strongly**	**Don't know**
Depression						
Stress						
Schizophrenia						
Bipolar disorder (manic depression)						
Drug addiction						
Grief						

Appendix N- Attitudes Toward Seeking Professional Psychological Help-Short Form

Instructions: Read each statement carefully and indicate your degree of agreement using the scale below. In responding, please be completely candid.

0 = Disagree
1 = Partly disagree
2 = Partly agree
3 = Agree

1.	If I believed I was having a mental breakdown, my first inclination would be to get professional attention.	
2.	The idea of talking about problems with a psychologist strikes me as a poor way to get rid of emotional conflicts.	
3.	If I were experiencing a serious emotional crisis at this point in my life, I would be confident that I could find relief in psychotherapy.	
4.	There is something admirable in the attitude of a person who is willing to cope with his or her conflicts and fears without resorting to professional help.	
5.	I would want to get psychological help if I were worried or upset for a long period of time.	
6.	I might want to have psychological counselling in the future.	
7.	A person with an emotional problem is not likely to solve it alone; he or she is likely to solve it with professional help.	
8.	Considering the time and expense involved in psychotherapy, it would have doubtful value for a person like me.	
9.	A person should work out his or her own problems; getting psychological counselling would be a last resort.	
10.	Personal and emotional troubles, like many things, tend to work out by themselves.	

Appendix O- Stigma Scale for Receiving Psychological Help

		0 Strongly disagree	**1 Disagree**	**2 Agree**	**3 Strongly agree**
1.	Seeing a psychologist for emotional or interpersonal problems carries social stigma.				
2.	It is a sign of personal weakness or inadequacy to see a psychologist for emotional or interpersonal problems.				
3.	People will see a person in a less favourable way if they come to know that he/she has seen a psychologist.				
4.	It is advisable for a person to hide from people that he/she has seen a psychologist.				
5.	People tend to like less those who are receiving professional psychological help.				

Appendix P- Self-Scale of Seeking Help

		Strongly disagree				Strongly agree
		1	**2**	**3**	**4**	**5**
1.	I would feel inadequate if I went to a therapist for psychological help.					
2.	My self-confidence would NOT be threatened if I sought professional help.					
3.	Seeking psychological help would make me feel less intelligent.					
4.	My self-esteem would increase if I talked to a therapist.					
5.	My view of myself would not change just because I made the choice to see a therapist.					
6.	It would make me feel inferior to ask a therapist for help.					
7.	I would feel okay about myself if I made the choice to seek professional help.					
8.	If I went to a therapist, I would be less satisfied with myself.					
9.	My self-confidence would remain the same if I sought help for a problem I could not solve.					
10.	I would feel worse about myself if I could not solve my own problems.					

Appendix Q- Inventory of Attitudes towards Seeking Mental Health Services

The term professional refers to individuals who have been trained to deal with mental health problems (e.g., psychologists, psychiatrists, social workers, and family physicians).

The term psychological problems refers to reasons one might visit a professional. Similar terms include mental health concerns, emotional problems, mental troubles, and personal difficulties.

For each item, indicate whether you disagree (0), somewhat disagree (l), are undecided (2), somewhat agree (3), or agree (4):

	0	1	2	3	4
There are certain problems which should not be discussed outside of one's immediate family					
I would have a very good idea of what to do and who to talk to if I decided to seek professional help for psychological problems					
I would not want my significant other (spouse, partner, etc.) to know if I were suffering from psychological problems.					
Keeping one's mind on a job is a good solution for avoiding personal worries and concerns.					
If good friends asked my advice about a psychological problem, I might recommend that they see a professional.					
Having been mentally ill carries with it a burden of shame.					
It is probably best not to know everything about oneself					
If I were experiencing a serious psychological problem at this point in my life, I would be confident that I could find relief in psychotherapy.					
People should work out their own problems; getting professional help should be a last resort.					
If I were to experience psychological problems, I could get professional help if I wanted to.					
Important people in my life would think less of me if they were to find out that I was experiencing psychological problems.					
Psychological problems, like many things, tend to work out by themselves.					

It would be relatively easy for me to find the time to see a professional for psychological problems.					
There are experiences in my life I would not discuss with anyone.					
I would want to get professional help if I were worried or upset for a long period of time.					
I would be uncomfortable seeking professional help for psychological problems because people in my social or business circles might find out about it.					
Having been diagnosed with a mental disorder is a bolt on a person's life.					
There is something admirable in the attitude of people who are willing to cope with their conflicts and fears without resorting to professional help.					
If I believed I were having a mental breakdown, my first inclination would be to get professional attention.					
I would feel uneasy going to a professional because of what some people would think.					
People with strong characters can get over psychological problems by themselves and would have little need for professional help.					
I would willingly confide intimate matters to an appropriate person if I thought it might help me or a member of my family.					
Had I received treatment for psychological problems, I would not feel that it ought to be "covered up."					
I would be embarrassed if my neighbour saw me going into the office of a professional who deals with psychological problems.					

Appendix R- Mental Health Literacy Scale

Ability to Recognise Disorders Subscale

	Very unlikely	**Unlikely**	**Likely**	**Very Likely**
If someone became extremely nervous or anxious in one or more situations with other people (e.g., a party) or performance situations (e.g., presenting at a meeting) in which they were afraid of being evaluated by others and that they would act in a way that was humiliating or feel embarrassed, then to what extent do you think it is likely they have **Social Phobia**				
If someone experienced excessive worry about a number of events or activities where this level of concern was not warranted, had difficulty controlling this worry and had physical symptoms such as having tense muscles and feeling fatigued then to what extent do you think it is likely they have **Generalised Anxiety Disorder**				
If someone experienced a low mood for two or more weeks, had a loss of pleasure or interest in their normal activities and experienced changes in their appetite and sleep then to what extent do you think it is likely they have **Major Depressive Disorder**				
To what extent do you think it is likely that **Personality Disorders** are a category of mental illness				
To what extent do you think it is likely that **Dysthymia** is a disorder				
To what extent do you think it is likely that the diagnosis of **Agoraphobia** includes anxiety about situations where escape may be difficult or embarrassing				
To what extent do you think it is likely that the diagnosis of **Bipolar Disorder** includes experiencing periods of elevated (i.e., high) and periods of depressed (i.e., low) mood				
To what extent do you think it is likely that the diagnosis of **Drug Dependence** includes physical and psychological tolerance of the drug (i.e., require more of the drug to get the same effect)				

Knowledge of Risk Factors and Causes Subscale

	Very unlikely	**Unlikely**	**Likely**	**Very Likely**
To what extent do you think it is likely that in general, **women are MORE likely to experience a mental illness of any kind compared to men**				
To what extent do you think it is likely that in general, **men are MORE likely to experience an anxiety disorder compared to women**				

Knowledge of Self-Treatment Subscale

	Very unhelpful	**Helpful**	**Helpful**	**Very helpful**
To what extent do you think it would be helpful for someone to **improve their quality of sleep** if they were having difficulties managing their emotions (e.g., becoming very anxious or depressed)				
To what extent do you think it would be				

helpful for someone to **avoid all activities or situations that made them feel anxious** if they were having difficulties managing their emotions				

Knowledge of Professional Help Available Subscale

	Very unlikely	**Unlikely**	**Likely**	**Very Likely**
To what extent do you think it is likely that **Cognitive Behaviour Therapy (CBT)** is a therapy based on challenging negative thoughts and increasing helpful behaviours				
Mental health professionals are bound by confidentiality; however there are certain conditions under which this does not apply. To what extent do you think it is likely that the following is a condition that would allow a mental health professional to **break confidentiality**:				
If you are at immediate risk of harm to yourself or others				
If your problem is not life-threatening and they want to assist others to better support you				

Knowledge of Where to Seek Information Subscale

Please indicate to what extent you agree with the following statements:

	Strongly disagree	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
I am confident that I know where to seek information about mental illness					
I am confident using the computer or telephone to seek information about mental illness					
I am confident attending face to face appointments to seek information about mental illness (e.g., seeing the GP)					
I am confident I have access to resources (e.g., GP, internet, friends) that I can use to seek information about mental illness					

Attitudes that Promote Recognition and Reduce Stigma Subscale

Please indicate to what extent you agree with the following statements:

	Strongly disagree	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
People with a mental illness could snap out if it if they wanted					
A mental illness is a sign of personal weakness					
A mental illness is not a real medical illness					
People with a mental illness are dangerous					
It is best to avoid people with a mental illness so that you don't develop this problem					
If I had a mental illness I would not tell anyone					
Seeing a mental health professional means you are not strong enough to manage your own difficulties					

If I had a mental illness, I would not seek help from a mental health professional					
I believe treatment for a mental illness, provided by a mental health professional, would not be effective					

Please indicate to what extent you agree with the following statements:

	Definitely unwilling	**Probably unwilling**	**Neither unwilling or willing**	**Probably willing**	**Definitely willing**
How willing would you be to move next door to someone with a mental illness?					
How willing would you be to spend an evening socialising with someone with a mental illness?					
How willing would you be to make friends with someone with a mental illness?					
How willing would you be to have someone with a mental illness start working closely with you on a job?					
How willing would you be to have someone with a mental illness marry into your family?					
How willing would you be to vote for a politician if you knew they had suffered a mental illness?					
How willing would you be to employ someone if you knew they had a mental illness?					

Appendix S- Multicomponent Mental Health Literacy Measure

Knowledge-oriented Mental Health Literacy	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	I don't know
Counselling is a helpful treatment for depression.						
A person with schizophrenia may see things that are not really there.						
Early diagnosis of a mental illness can improve chances of getting better.						
Attending peer support groups helps recovery from mental illness.						
Unexplained physical pain or fatigue can be a sign of depression.						
Cognitive behavioral therapy can change the way a person thinks and reacts to stress.						
A person with bipolar disorder may show a dramatic change in mood.						
Taking prescribed medications for mental illness is effective.						
When a person stops taking care of his or her appearance, it may be a sign of depression						
Drinking alcohol makes symptoms of mental illness worse.						
A person with mental illness can receive treatment in a community setting.						
A person with anxiety disorders has excessive anxiousness or fear.						

Belief-oriented Mental Health Literacy	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	I don't know
A highly religious/spiritual person does not develop mental illnesses.						
Depression is a sign of personal weakness.						
Mental illness is a short-term disorder.						
Recovery from mental illness is mostly dependent on chance or fate.						
A person with depression should not be asked if he or she has thoughts of suicide.						
Poor parenting causes schizophrenia.						
Mental illness will improve with time, even without treatment.						
Recovering from a mental illness is the same as being cured.						
A person can stop hoarding whenever he/she wants to.						
A person with depression will get better on his or her own without treatment.						
Resource-oriented Mental Health Literacy	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**I don't know**
I know where to go to receive mental health services.						
I know how to get the number of a suicide prevention hotline.						
I know where to get useful information about mental illness.						
I know how to contact a mental health clinic in my area.						

Appendix T- Plain Language Statement and Informed Consent Form-Study 1

Plain Language Statement

Principal Investigator: Ms. Sinead O'Keeffe **Supervisors:** Dr Siobhán O'Connor
Dr Niamh Ní Chéilleachair

Purpose of Study

The aim of the study is to establish musculoskeletal injury incidence in male adolescents participating in Gaelic football, identify how common injuries are in male adolescents that participate in the sport and how they affect participation and absence from physical activity, sport and school. We are also looking at levels of Gaelic football participation, overall physical activity and training and will measure the levels using a hand-written weekly training log, which will be filled out once a week. We will also be assessing the psychological effects of injury on each participant.

What is required of *you*?

You are required to report to me any injury sustained during the week, whether or not your symptoms have resolved by the examination day. Once you report to me, I will complete a free of charge musculoskeletal examination of your injury and inform you of the injury diagnosis. An Athlete Fear-Avoidance Questionnaire (AFAQ) will be completed by you after the injury assessment and before you return to play, you will return to me in order to complete the Injury-Psychological Readiness to Return to Sport (I-PRSS) Scale and the AFAQ questionnaire a second time. You will also be required to complete a weekly written training diary that will record the time you spend partaking in physical activity and sport each week.

Location and Supervision

All injury examinations will be completed within the club. I, the principal investigator, am a Certified Athletic Therapist with full graduate membership of Athletic Rehabilitation Therapists Ireland (ARTI) which includes professional indemnity insurance. I will be assisted in each examination by final year students of BSc (Hons) in Athletic and Rehabilitation Therapy in Athlone I.T. The final year students have been Garda Vetted and have previous experience working with the public from two years of clinical placements prior to assisting on this research study. They will assist with the injury examinations and completing injury report forms. I have also been Garda vetted and underwent a short course on Recognising and Reporting Child Abuse in a Sporting Setting while on internship/placement in the US. I also have a wealth of experience of working with children in an activity/sports setting along with the experience I bring from a coaching and refereeing perspective.

Testing Procedures

Musculoskeletal Injury Examination- Injury examinations will be conducted using standard assessment techniques. A standard injury report form will be completed using your assigned ID number instead of your name to ensure your details remain confidential. Once a diagnosis has been made you will be informed of the diagnosis and will be provided with the referral details of an appropriate healthcare professional (e.g. GP, chartered physiotherapist, athletic therapist) if deemed necessary.

Psychological Questionnaires-After your injury has been assessed by the principal investigator or the final year students, you will be required to complete the Athlete Fear-Avoidance Questionnaire (AFAQ). Instructions on how to complete the questionnaire will be explained by the principal investigator and you will be given every opportunity to ask any questions which may arise. A 15-minute period will then be allocated to allow you to complete the questionnaire. You are free to complete the questionnaire anywhere in the assessment room in order to ensure those present do not influence your answers but it must be completed before you leave the room. Prior

to your return to play, you will be required to return to the assessment room in order to complete the Injury-Psychological Readiness to Return to Sport (I-PRSS) Scale and the AFAQ questionnaire a second time.

Training Diary - You will fill out a written training diary, where you will submit the amount of physical activity you have completed that week, once a week at a designated time (e.g. during the physical education class) using a standardised hand-written training diary.

Potential Risks

Physical discomfort may occur during the musculoskeletal injury examination. However, as with any musculoskeletal examination some degree of discomfort or pain will be reproduced in order to make an accurate injury diagnosis. Any physical discomfort that may occur is no greater than that associated with a musculoskeletal examination from any physician, athletic rehabilitation therapist or chartered physiotherapist.

Benefits

By taking part in this study you will receive free of charge musculoskeletal injury examinations and once you have been given your diagnosis you will also be given a list of appropriate referrals to treat your injury. The referral may be to a local physician, athletic therapist or chartered physiotherapist. This study hopes to identify injury trends in order to design and implement injury prevention programmes to reduce future injury to males. You will also be given an insight into the design and implementation of research that will have a significant effect on future generations. This insight may spark an interest in this field and perhaps it could be of assistance with college decisions you will be making in the coming years.

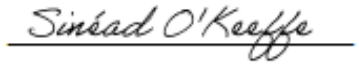
Confidentiality

The results and data collected from this study are regarded as confidential and will be used by the investigating team only. All injury report forms and training diaries will be stored in a locked filing cabinet and will not leave Athlone IT. This cabinet will only be accessible to the principal investigator and the supervisors of this study. Your data will be kept anonymous through a personal ID number and the data will be destroyed 5 years after publication of this study.

Freedom of Withdrawal

Participation in this study is completely voluntary and therefore you have the right to withdraw from the study at any time, without prior notice or reason.

We hope that you are willing to participate in this research study, if you have any further questions or concerns please feel free to get in contact.



Sinead O'Keeffe- *Principal Investigator*

Email: s.okeeffe@research.ait.ie

Informed Consent Form

Epidemiology of Musculoskeletal Injury in Male Adolescents in One Year

- I have read and understand all the information presented in the volunteer information sheet provided.
- I understand what the project entails and what the results will be used for.
- I comprehend all testing procedures and they have been verbally explained to me in full.
- I am aware of the potential risks and benefits involved with participating in the study.
- I understand that all my information will be kept confidential and will be coded using subject IDs.
- I recognise that the results of the study may be published but the identity of my son will remain confidential.
- I am aware that participation in this study is voluntary and that my son can withdraw/ I can withdraw my son from the study at any given time without giving a reason.
- I understand that if I/my son have any questions regarding any aspect of this research study I/my son can contact any of the investigators involved with this study.

Participant's (Adolescents) Name: _____
Parent/Guardian Signature: _____
Participant's Signature: _____
Date: _____

For Office Use Only:
Principal Investigator's Signature: _____
Date: _____

Appendix U- Pre-Participation Questionnaire

Club:	**ID Number:**	**D.O.B.:**

Basic Information:

- Height: _____ meters (m)
- Weight: _____ kilograms (kg)
- Dominant Hand: Right ☐ Left ☐ Kicking Leg: Right ☐ Left ☐
  Jumping Leg: Right ☐ Left ☐
- Leg Length: Right ☐ Left ☐
- Three Hop Distance: Left

1.	cm
2.	cm
3.	cm

Right

1.	cm
2.	cm
3.	cm

Current Physical Activity Participation:

	Sport or Activity Involved In:	**Average Hours Participating Per Week:**	**Years and Months Involved in the Sport:**	**Level(s) Played At e.g., School, Club, County, Provincial, National, Other**
1.				
2.				
3.				
4.				
5.				

Injury History:

1. Over the past 12 months have you sustained a musculoskeletal injury while participating in some form of physical activity? YES ☐ NO ☐

2. Have you had more than one injury over the last 12 months? YES ☐ NO ☐
If yes, how many injuries have you had? _____

3. Can you recall the most severe injury you have ever had? e.g., ankle sprain, hamstring strain… _____

4. Has the same injury ever re-occurred? YES ☐ NO ☐
If yes, what was the duration between occurrences? _____

5. Did you receive treatment for your injury? YES ☐ NO ☐

6. What form of treatment did you receive?
Hospital/A&E ☐ GP ☐ Chartered Physio ☐

Athletic Therapist ☐ Other ☐

7. Did your injury require a scan? YES ☐ NO ☐ If so, what type of scan? _____

8. Did your injury require surgery? YES ☐ NO ☐ If so, what? _____

9. As a result of your injury, did you lose time from your sport/activity? YES ☐ NO ☐
If yes, how long? _____

10. As a result of your injury, did you miss time from school? YES ☐ NO ☐
If yes, how long? (If only one day for scan etc. include that) _____

11. Did you complete any rehabilitation for your injury? YES ☐ NO ☐

12. Do you feel you completed adequate rehabilitation before returning to physical activity? YES ☐ NO ☐

13. If you felt like you <u>did not</u> complete adequate rehabilitation/recovery before returning to physical activity, why?
_____

14. Do you feel like you returned to activity too early? YES ☐ NO ☐

15. Do you feel like there was pressure on you to return to activity early? YES ☐ NO ☐

16. If so, who did feel put pressure on you? SELF ☐ COACH ☐ PARENT(S) ☐
OTHER ☐

17. Do you feel your performance is similar or improved compared to pre-injury?
YES ☐ NO ☐
If no, please explain why:
_____

Appendix V- Self-Recall Weekly Training Log

Epidemiology of Musculoskeletal Injury in Male Adolescents in One Year

ID Number: **Today's date:** **Week no.:**

- ***What to include:*** Any individual or team training including any gym or conditioning sessions as well as regular sports specific sessions.
- ***Club/County/School/National/Self/Other:*** Just state club/county/school/national for which organisation the physical activity was completed. Use self if not completed as part of a session for an organisation.
- ***Duration/Time Played:*** duration of training or duration of match played in minutes (e.g., if taken off at half time, state 30 minutes played)
- ***Session RPE:*** Rate the difficulty of the session using the following scale

0	1	2	3	4	5	6	7	8	9	10
Rest	**Very, very easy**	**Easy**	**Moderate**	**Somewhat hard**	**Hard**		**Very hard**			**Maximal**

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Sport:							
Training/Match/Competition:							
Club/County/School/National/Self/Other:							
Duration/Time Played:	mins	mins	mins	mins	mins	mins	mins
Session RPE:	/10	/10	/10	/10	/10	/10	/10
Injury Occurred:	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐

Appendix W- Injury Report Form

Epidemiology of Musculoskeletal Injury in Adolescent Male Gaelic Footballers

Club: _____ **ID Number:** _____ **D.O.B.:** _____

Assessment/Today's Date: _____
Date of Injury: _____
Return to Activity Date:_____

1. Sport/Activity Injury Sustained in:
_____

2. Type of Competition:

- ☐ Competitive Competition
- ☐ Challenge/ Practice Competition
- ☐ Training
- ☐ Gym
- ☐ Other: _____

3. Team injured with (e.g., club, county, national, school):

_____

4. Surface playing on (e.g., grass, gym, artificial grass):

_____

5. Time when injured:

- ☐ Warm-up
- ☐ Cool down
- ☐ Time injured: ___ minutes/ ___ total possible minutes

6. VAS scale:
(Time of Injury & On Assessment)

7. Injury Location:

- ☐ Right
- ☐ Left
- ☐ Central
- ☐ Bilateral

8. Type of Mechanism:

- ☐ Acute
- ☐ Overuse
- ☐ Chronic

9. Onset of Injury Type:

- ☐ New Onset
- ☐ Recurrence

10. If recurrent, when was previous onset:

_____

11. Any time loss from play/school as a result of that recurrent injury?

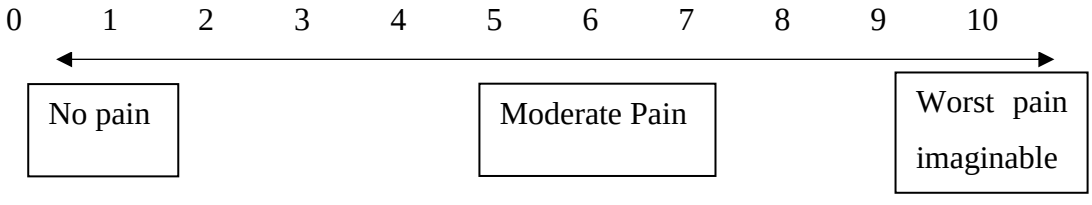
_____
_____

12. Was there any rehab/recovery time? If so, how long and did you return to competition before completing the full rehab/recovery time?

_____
_____

13. Protective Equipment worn at time of injury:

- ☐ Taping
- ☐ Bracing
- ☐ Other: _____



14. Injured Body Part:

- ☐ Head
- ☐ Face
- ☐ Eyes
- ☐ Ear
- ☐ Nose
- ☐ Teeth
- ☐ Neck/C-spine
- ☐ Sternum
- ☐ Ribs
- ☐ Upper back/T-spine
- ☐ Abdomen
- ☐ Lower back/L-spine
- ☐ Pelvis/Sacrum/SIJ
- ☐ Hip
- ☐ Groin
- ☐ Thigh
- ☐ Knee
- ☐ Calf/Achilles
- ☐ Shin
- ☐ Ankle
- ☐ Foot
- ☐ Toes
- ☐ Clavicle
- ☐ Upper Arm
- ☐ Elbow
- ☐ Forearm
- ☐ Wrist
- ☐ Hand
- ☐ Fingers
- ☐ Thumb

15. Mechanism of Injury

- ☐ Walking
- ☐ Running
- ☐ Sprinting
- ☐ Twisting
- ☐ Turning
- ☐ Backtracking
- ☐ Pivoting
- ☐ Jumping
- ☐ Landing
- ☐ Kicking
- ☐ Throwing
- ☐ Striking
- ☐ Shooting
- ☐ Passing
- ☐ Tackling
- ☐ Being Tackled
- ☐ Foul Play
- ☐ Equipment Failure
- ☐ Contact with other athlete
- ☐ Contact with moving object
- ☐ Contact with stationary object
- ☐ Overuse
- ☐ No MOI recalled
- ☐ Sports Specific _____
- ☐ Other _____

16. Type of Injury

Muscle:

- ☐ Muscle strain/tear
- ☐ Muscle cramp/DOMS
- ☐ Muscle tightness
- ☐ Muscle contusion/haematoma

Ligament:

- ☐ Ligament sprain
- ☐ Ligament avulsion/rupture

Tendon:

- ☐ Acute Tendon Injury
- ☐ Tendinopathy
- ☐ Tendon avulsion/rupture

Joint:

- ☐ General joint injury
- ☐ Global joint instability
- ☐ Meniscal/cartilage damage
- ☐ Dislocation
- ☐ Subluxation
- ☐ Spinal facet joint
- ☐ Bursitis

Bone:

- ☐ Bone bruising
- ☐ Fracture
- ☐ Stress fracture
- ☐ Other: _____

Other:

- ☐ Concussion + loss of consciousness
- ☐ Concussion – loss of consciousness
- ☐ Abrasion
- ☐ Laceration
- ☐ Nerve Injury
- ☐ Dental Injury
- ☐ Spinal Disc
- ☐ Other: _____

17. Injury Diagnosis (incl. grade & structure):

18. Referral advised:

- ☐ Yes
- ☐ No

19. Referral type advised:

- ☐ GP
- ☐ Hospital
- ☐ Physio/ATC
- ☐ Scan

20. Any other information:

_____

_____

Appendix X- Modified Athlete Fear-Avoidance Questionnaire (mAFAQ)

Modified Athlete Fear-Avoidance Questionnaire (mAFAQ)

ID Number: _____ Today's Date: _____

Instructions: We are interested in your feelings or thoughts when in pain as a result of a sports injury. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are in pain due to a sports injury.

Rating	**1**	**2**	**3**	**4**	**5**
Meaning	Not at all	To a slight degree	To a moderate degree	To a great degree	Completely agree

Statement	**Rating**
1. If I was injured, I would never be able to play as I did before my injury.	
2. If I was injured, I would be worried about my role with the team changing.	
3. If I was injured, I would be worried about what other people will think of me if I don't perform at the same level.	
4. If I was injured, I would not be sure what my injury is.	
5. If I was injured, I would believe that my current injury would jeopardise my future athletic abilities.	
6. If I was injured, I would not be comfortable going back to play until I am 100%.	
7. If I was injured, people would not understand how serious my injury is.	
8. If I was injured, I would not know if I was ready to play.	
9. If I was injured, I would worry if I go back to play too soon I would make my injury worse.	
10. If I was injured and my pain was intense, I would worry that my injury is a very serious one.	

Appendix Y- Plain Language Statement and Informed Consent Form-Study 2

Participant Information Sheet

Principal Investigator: Ms. Sinéad O'Keeffe **Supervisors:** Dr Niamh Ní Chéilleachair
Dr Siobhán O'Connor

Purpose of Study
The aim of this study is to examine Gaelic football players' perceptions of the negative psychological reaction to injury.

What is required of *you*?
You are required to present at the focus group discussion at the pre-arranged time and location in order to discuss and provide your opinion on the negative psychological reaction to injury of Gaelic football players.

Location and Supervision
All focus group discussions will be completed within the club by the principal investigator, a Certified Athletic Therapist with full graduate membership of Athletic Rehabilitation Therapists Ireland (ARTI), including professional indemnity insurance. I am a Cardiac First Responder and Emergency First Responder, as certified by the Pre-Hospital Emergency Care Council and I have been Garda vetted.

Testing Procedures
Focus Group Discussion- At the beginning of the focus group discussion, brief demographic information of all participants will be collected including age, gender, years playing Gaelic football and history of injury and each participant will be issued a name tag to facilitate the discussion. The focus group discussion will begin with instructions on appropriate focus group behaviour as well as confidentiality and the voluntary nature of the discussion. Participants will be advised that the purpose of the focus group discussion is to examine your perceptions of the negative psychological reaction to injury in Gaelic football players. A combination of discussion and written tasks will be utilised to gather your perceptions of the negative psychological reaction to injury in Gaelic footballers.

Potential Risks
Participants may feel uncomfortable discussing psychological distress that is experienced following injury. However, the primary investigator has completed psychology of injury modules and is trained in identifying athletes in need of psychological assistance and if deemed necessary, referral to the appropriate health care provider will be completed.

Benefits
By taking part in this study, participants will be offered an opportunity to express their opinions. Participants may get an insight into negative psychological reactions to injury as perceived by their peers or other Gaelic footballers, coaches or sports medicine staff. Participants will also be given an insight into the design and implementation of research that will have a significant effect on future generations.

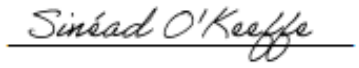
Confidentiality

The results and data collected from this study are regarded as confidential and will be used by the investigating team only. Video and audio recordings will be stored on an encrypted hard drive with access primarily granted to the primary investigator. Your data will be kept anonymous with the use of a personal ID number and the data will be destroyed 5 years after publication of this study.

Freedom of Withdrawal

Participation in this study is completely voluntary and therefore you have the right to withdraw from the study at any time, without prior notice or reason.

We hope that you are willing to participate in this research study, if you have any further questions or concerns please feel free to get in contact.



Sinead O'Keeffe- *Principal Investigator*

Email: s.okeeffe@research.ait.ie Phone: 090-6468149

Supervisors:

Dr Niamh Ní Chéilleachair- nnicheilleachair@ait.ie

Dr Siobhán O'Connor- siobhan.oconnor@dcu.ie

Informed Consent Form

Research project title: ***The Psychology of Musculoskeletal Injury in Elite and Sub-Elite Gaelic Football Players***

Research investigator: **Sinéad O'Keeffe**

- I agree to participate in the focus group discussion carried out by Sinéad O'Keeffe of Athlone Institute of Technology, to aid with the research of the psychology of musculoskeletal injury in elite and sub-elite Gaelic football players.
- I have read the information sheet related to the research project and understand the aims of the project.
- I am aware of the topics to be discussed in the focus group.
- I am fully aware that I will remain anonymous throughout data reported and that I have the right to leave the focus group at any point.
- I am fully aware that data collected will be stored securely, safely and in accordance with Data Collection Act (1998).
- I am fully aware that I am not obliged to answer any question, but that I do so at my own free will.
- I agree to have the focus group recorded (in audio and video), so it can be transcribed after the focus group is held.

Printed Name: _____

Participant's Signature: _____

Date: _____

Principal Investigator's Signature: _____

Date: _____

Appendix Z- Instructions for Appropriate Focus Group Behaviour

Instructions for Focus Group Discussion Participants

Appropriate focus group behaviour – Thank you for agreeing to participate in this focus group discussion. We are interested in the views and opinions of all participants and not of particular individuals. I am going to ask you some questions about your perception of barriers and facilitators to help-seeking when experiencing psychological distress post-injury. I hope these questions will simulate discussion amongst you. I will not be contributing to the discussion but I am here to moderate the session by keeping track of time and making sure all of the issues of interest are discussed. You can ask me to repeat a question if you need to, but apart from that, I will contribute as little as possible. I am also going to record the discussion, so please speak clearly. Try to voice your opinion as often as possible but not at the expense of interrupting each other.
(Breen, 2006)

Confidentiality – All participants are reminded that the focus group discussion will be recorded in audio and in video. Recordings will solely be used in the analysis of responses. Access to the recordings will be limited to the research staff and will be stored on an encrypted hard drive. Public presentation of any piece of the recordings will not take place.
Obviously an inherent issue with discussion as part of a group is that anything shared with the researcher is shared with the other people in the discussion also. However, participants will not be questioned individually on their personal experiences of psychological distress post-injury and will purely be asked to discuss their perceptions and opinions.
(Morgan, 1997)

Voluntary nature of the discussion - Participation in the focus group discussion is entirely voluntary and you may stop participating at any time. If you feel uncomfortable discussing any aspect of the discussion, feel free to opt out of discussing that topic.

Appendix AA- Written Ranking Tasks

Please rank the top 3 barriers below by numbering them (1 ,2, 3) in order of those you see as the most important in ***stopping*** an athlete from seeking help when experiencing psychological distress post-injury.

Barrier	
Not knowing about mental disorders or what the symptoms are	
Not knowing when to seek help	
Not knowing how or where to seek help	
Not knowing what to expect in a doctor's appointment or counselling session	
Gender	
Culture	
Religion	
Age group	
Not having enough time	
Cost of Services	
Location of Services	
Transportation	
How you feel about yourself seeking help	
Worried about what your coach will think	
Worried about what your teammates will think	
Worried about what your friends will think	
Worried about what your family will think	
Trusting your psychologist	
Worried about what others will think	
Other (please explain)	

Please rank the top 3 facilitators below by numbering them (1 ,2, 3) in order of those you see as the most important that could make it ***easier*** to get help when experiencing psychological distress post-injury.

Facilitator	
Being aware of your feelings and finding it easy to express them	
Already knowing a health professional quite well (e.g., counsellor, doctor)	
Coach has a positive attitude to seeking help	
Teammates have a positive attitude to seeking help	
Friends have a positive attitude to seeking help	
Family have a positive attitude to seeking help	
Other people have a positive attitude to seeking help	
Other people's encouragement to seek help	
The staff (e.g., receptionist, doctor, counsellor) are friendly and approachable	
All athletes are required to see a counsellor or psychologist as part of their preparation and training	
Anonymous access to information and help (e.g., the internet)	
Information	
Other (please explain)	

Appendix AB- Standards for Reporting Qualitative Research

Topic	Page No(s).
Title and Abstract	
Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	163
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	164
Introduction	
Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	165-168
Purpose or research question - Purpose of the study and specific objectives or questions	168
Methods	
Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., post-positivist, constructivist/ interpretivist) is also recommended; rationale**	169
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	170
Context - Setting/site and salient contextual factors; rationale**	169-170
Sampling strategy – How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	169
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	169
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	170-171
Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	170-171 Appendix Z Appendix AA

Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	169-170 175
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	171-172
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	171-172
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	172
Results/Findings	
Synthesis and interpretation – Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	172-194
Links to empirical data – Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	172-194
Discussion	
Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	194-203
Limitations – Trustworthiness and limitations of findings	203-204
Other	
Conflicts of interest – Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	N/A
Funding – Sources of funding and other support; role of funders in data collection, interpretation, and reporting	Funded by AIT Seed Fund

Appendix AC- 'GAA – Injury and a Healthy Mind Presentation' Content

Injury and a Healthy Mind - GAA Mental Health Initiative

What does MENTAL HEALTH mean to YOU?

World Health Organization

Mental health is a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community.

MENTAL HEALTH and MENTAL ILLNESS Continuum

MENTAL HEALTH STRESSORS

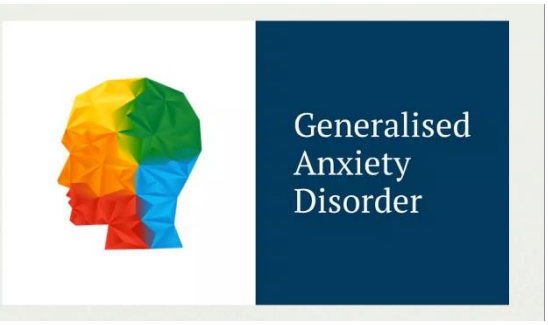
Performance Stressors

MENTAL HEALTH STRESSORS

Competitive and Organisational Stressors

MENTAL HEALTH STRESSORS

Everyday Stressors



MAJOR DEPRESSIVE DISORDER - Example

- Michael, 24, senior club player

- ❖Visibly upset
- ❖Fatigued
- ❖Lacks ability to focus on his rehab
- ❖Weight loss
- ❖Isolating himself
- ❖Considering quitting
- ❖Suicidal thoughts
- ❖Severe intoxication

CLINICAL and SUB-CLINICAL CONDITIONS

DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS
FIFTH EDITION
DSM-5™

- **Depressive Disorders**
- **Anxiety Disorders**
- **Trauma- and Stressor-Related Disorders**
- **Feeding and Eating Disorders**
- **Sleep-Wake Disorders**
- **Substance-Related and Addictive Disorders**

CLINICAL and SUB-CLINICAL CONDITIONS

- Anger
- Frustration
- Sadness
- Fatigue
- Emotional withdrawal
- Unwillingness to complete rehab
- Isolating yourself from your teammates and friends

Help-Seeking RESOURCES

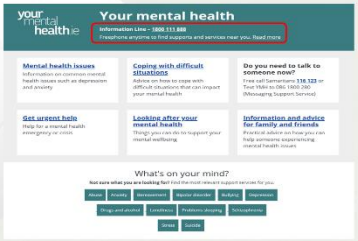
- Where to get help?

❖ Speak to your GP

Help-Seeking RESOURCES

- Where to get help?

❖ Contact HSE supports



Help-Seeking RESOURCES

- Where to get help?

❖ Contact a charity

SAMARITANS

116 123 24 Hours

jo@samaritans.ie

Pieta House

1800 247 247 24 Hours

HELP to 51444

Help-Seeking RESOURCES

- Where to get help?

❖ Contact a charity

Aware
Your supporting light through depression

1800 80 48 48
10AM-10PM

supportmail@aware.ie

❖ *Online resources:*
- SpunOut.ie
- Jigsaw.ie
- myMind.org
- bodyWhys.ie
- turn2me.org

Help-Seeking RESOURCES

- Where to get help?

❖ Speak to a psychologist

Help-Seeking RESOURCES

- Where to get help?

❖ Speak to your Athletic Therapist or Physiotherapist

Help-Seeking RESOURCES

- When to get help?

IT'S OK TO NOT BE OK

When experiencing *clinical* or *sub-clinical* conditions

Help-Seeking RESOURCES

- How to get help?

Sources of aid:
- In-person
- Phone
- Online

Self-help strategies:
- Adequate sleep
- Nutrition
- Remain active and adhere to rehabilitation
- Engage with friends and family

PROFESSIONAL HELP-SEEKING

- Cognitive Behavioural Therapy (CBT)
  - aimed at evaluating, challenging and modifying the way that you think and behave

CBT

- Mindfulness
  - paying attention in the moment in an intentional and purposeful way

MINDFULNESS

Help-Seeking RESOURCES

- **How to help others?**

❖ **R**ecognise
❖ **R**each Out
❖ **R**efer
❖ **R**emain supportive

Mental Health in Sport Action Plan

Mental Health – MYTHS and MISCONCEPTIONS

Physical health issues are worse than mental health issues.

Mental Health – MYTHS and MISCONCEPTIONS

Mental health issues are a sign of weakness.

Mental Health – MYTHS and MISCONCEPTIONS

Mental health issues are common.

Mental Health – MYTHS and MISCONCEPTIONS

There is not much you can do to help a friend with a mental health issue.

Mental Health – MYTHS and MISCONCEPTIONS

You can recover from a mental health issue.

WHY SEEK PSYCHOLOGICAL HELP

Improve mental health	Improve life satisfaction	Increase self-confidence	More optimistic attitude	Happiness
Resolve one's problems	Improve sleep	Reduce stress	Increase energy	Self-awareness / personal growth
Increase communication	Increase comfort sharing feelings with others	Improve relationships	Increase social support	

Aishling Sheridan
Cavan Ladies Senior Footballer

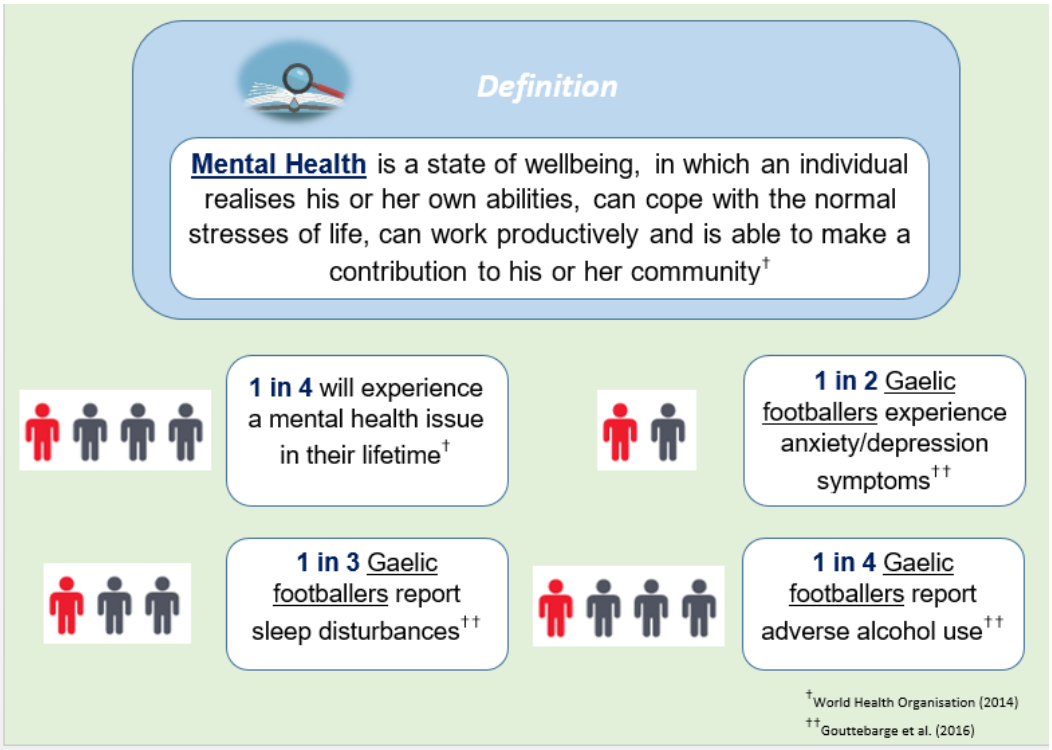
Evan Comerford
Dublin Senior Footballer

SUMMARY

Help

GAA Mental Health – Injury and a Healthy Mind Initiative

Appendix AD- Mental Health Toolkit Information Pack



Injury can cause symptoms of a mental health issue

Mental Health may also be influenced by

Performance Stressors (underperforming, internal expectation to play well)

Competitive and Organisational Stressors (public and media scrutiny, the duration of travel time to and from training and competitions)

Everyday Stressors (relationship problems, academic commitments, financial pressures, work-life balance)

Anxiety

Symptoms:

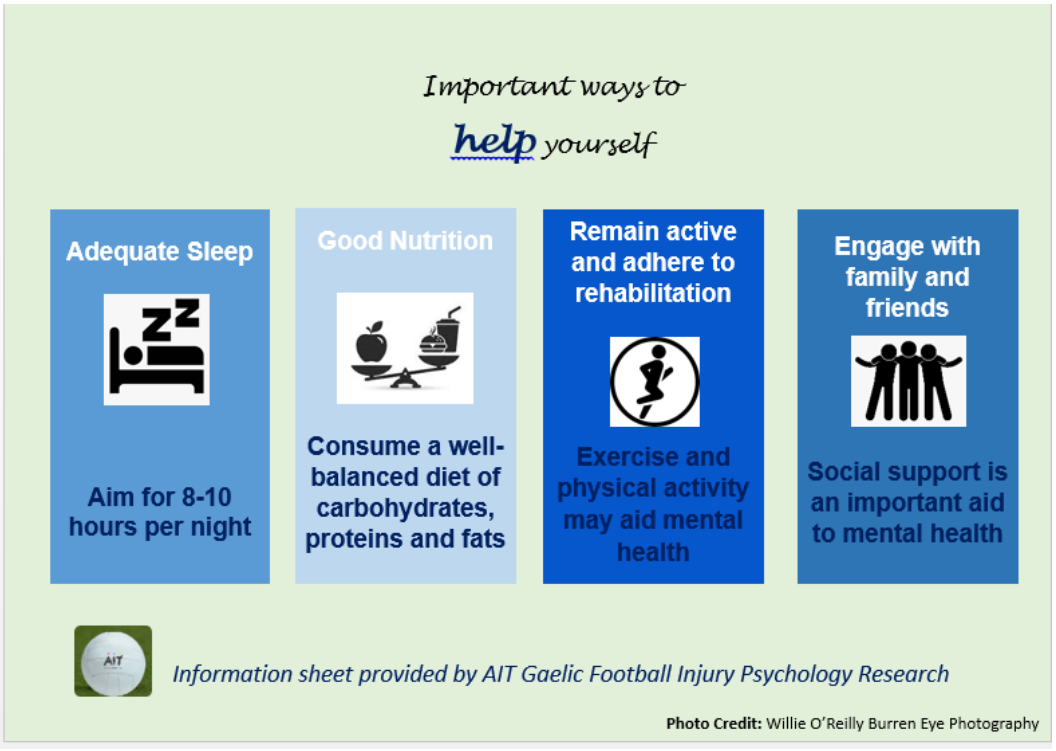
- Uncontrollable and excessive worrying about several events and activities for more days than not for at least a period of 6 months causing significant distress/impairment
- Restlessness or feeling keyed up or on edge
- Being easily fatigued
- Difficulty concentrating/mind going blank
- Irritability
- Muscle tension
- Sleep disturbances

Depression

Symptoms:

- Depressed mood or loss of interest or pleasure for at least 2 weeks
- Significant unintentional weight loss or gain
- Insomnia or sleeping too much
- Slowing down of thought and a reduction of physical movement noticed by others
- Fatigue/loss of energy
- Feelings of worthlessness/excessive guilt
- Reduced ability to think/concentrate or indecisiveness
- Repeated thoughts of death


It's OK ... to not be OK
Help is available in-person, online or by phone
❖Speak to your local GP
❖Contact the HSE
your mental health.ie
1800 111 888
❖Speak to your Athletic Therapist or Physiotherapist
❖Contact a charity:
SAMARITANS
116 123
jo@samaritans.ie
Pieta House
1800 247 247
HELP to 51444
❖Speak to a Psychologist
psychologicalsociety.ie


Important ways to help yourself
Adequate Sleep
Aim for 8-10 hours per night
Good Nutrition
Consume a well-balanced diet of carbohydrates, proteins and fats
Remain active and adhere to rehabilitation
Exercise and physical activity may aid mental health
Engage with family and friends
Social support is an important aid to mental health
Information sheet provided by AIT Gaelic Football Injury Psychology Research
Photo Credit: Willie O'Reilly Burren Eye Photography

Appendix AE- Content and Process Evaluation Measure

Statements	1	2	3	4
	Not at all	**A little**	**A lot**	**Very**
How satisfied were you with the content of the presentation?				
How helpful do you think the content of the presentation was?				
How relevant do you think the content of the presentation was?				
Overall, how much did you enjoy the presentation?				
Overall, how much did you learn from the presentation?				
Overall, the presenter knew the content well and communicated it clearly.				
How important do you think the content of the presentation was?				
Overall, how easy was the content of the presentation to understand?				
Overall, how likely are you to recommend this presentation to a friend?				

What did you like about the educational programme?
What did you not like about the educational programme?
What, if anything, would you change about the educational programme?
Did you find the Information Leaflet you received to be helpful? Please explain why.
Any other comments?

Appendix AF- Plain Language Statement and Informed Consent Form-Study 3

Participant Information Sheet

Principal Investigator: Ms. Sinéad O'Keeffe s.okeeffe@research.ait.ie

Supervisors: Dr Niamh Ní Chéilleachair
Dr Siobhán O'Connor
Dr Mark Campbell

Purpose of Study
The aim of this study is to develop and implement a novel educational intervention programme aimed to increase mental health literacy, reduce stigma and improve attitudes to seeking professional psychological help following injury in adult Gaelic footballers.

What is required of *you*?
We ask you to complete online questionnaires examining your mental health literacy on four occasions, as directed by the principal investigator. Links to the questionnaires will be provided by email. We may also invite you to attend an online Zoom presentation.

Potential Risks
As mental health is a sensitive topic, you may feel uncomfortable participating in this research at any point. However, participants will not be asked to disclose any private information regarding their own mental health or experience of psychological distress. If you are experiencing mental health issues, it is recommended to contact your GP.

Benefits
By taking part in this study, participants will be offered an opportunity to learn more about their knowledge, recognition and attitudes to mental health.

Confidentiality
The results and data collected from this study are regarded as confidential and will be used by the investigating team only. Your data will be kept anonymous with the use of a personal ID number and the data will be destroyed 5 years after publication of this study.

Freedom of Withdrawal
Participation in this study is completely voluntary and therefore you have the right to withdraw from the study at any time, without prior notice or reason.

Informed Consent Form (*provided in Google Forms*)

I have read and fully understand the Participant Information Sheet and give my consent to participate in the research project.

I consent. ☐

I agree for my data to be included in the current research project and to withdraw, I must email the primary researcher.

I agree. ☐

Appendix AG- Brunel Mood Scale

Instructions: Below is a list of words that describe feelings. Please read each one carefully. Then select the option that best describes **HOW YOU FEEL RIGHT NOW.**

	0	**1**	**2**	**3**	**4**
	Not at all	**A little**	**Moderately**	**Quite a lot**	**Extremely**
Panicky					
Lively					
Confused					
Worn Out					
Depressed					
Downhearted					
Annoyed					
Exhausted					
Mixed-up					
Sleepy					
Bitter					
Unhappy					
Anxious					
Worried					
Energetic					
Miserable					
Muddled					
Nervous					
Angry					
Active					
Tired					
Bad-tempered					
Alert					
Uncertain					