Eating psychopathology in athletes: methods of identification and intervention

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Eating psychopathology in athletes:
Methods of identification and intervention

by

Carolyn Rose Plateau

Doctoral Thesis
Submitted in partial fulfilment of the requirements
for the award of Doctor of Philosophy
of Loughborough University

September 2014
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Abstract

**Background:** The incidence of eating psychopathology in athletes is considerably higher than in the general population. Facilitating the early identification and successful management of eating problems in this group is therefore essential.

**Objectives:** The thesis aimed to improve our empirical understanding of the identification and management of eating problems in athletes. Three areas were investigated. First, a measure of compulsive exercise was evaluated as a method of identification of eating psychopathology in athletes. Second, the thesis explored coach methods of identification and management of eating problems among their athletes. Finally, athlete experiences of disclosing and seeking treatment for eating disorders were explored.

**Main findings:** The Compulsive Exercise Test was found to be a useful measure in screening for eating psychopathology in athletes. Track and field coaches relied heavily on the physical symptoms of disordered eating when identifying potential eating problems in athletes. Coaches described difficulties in identifying eating psychopathology in athletes, and in signposting athletes to appropriate support. Individual differences in the perceived value of disclosing an eating disorder were discovered among athletes currently seeking treatment. Lastly, athletes described struggling to engage with their eating disorder treatment programme, particularly where exercise was restricted or reduced.

**Implications:** The findings suggest a need for greater support, education and resources for coaches and sports professionals in identifying and facilitating treatment access among their athletes. The Compulsive Exercise Test may be one way to assist sports professionals in identifying athletes with elevated levels of eating psychopathology. Athletes may be more willing to engage with treatment programmes when they are closely involved in goal setting and their exercise and sporting commitments are incorporated where possible.

**Keywords:** Athlete, sport, coach, eating disorder, compulsive exercise, measurement, identification, intervention, treatment.
Acknowledgements

I would like to thank the participants of the research studies included in this thesis. Your participation is greatly appreciated. Thank you in particular to the coaches and athletes who shared their experiences of eating disorders in sport so willingly.

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Thank you to my family and friends for reminding me that there is life beyond a PhD. I’m looking forward to catching up on what I have missed, particularly over these last few months.

Lastly, thank you to Andrew for your endless support and patience. I’m so glad that this PhD journey has led me to you.
Publications

Journal Papers


Conference Presentations


# Table of Contents

Abstract .............................................................................................................................................. ii
Acknowledgements ........................................................................................................................... iii
Publications ....................................................................................................................................... iv
Table of Contents .............................................................................................................................. vi
Abbreviations .................................................................................................................................... xi
List of Figures .................................................................................................................................. xii
List of Tables ................................................................................................................................... xiii

**Part 1: An introduction to eating psychopathology in athletes** .................................................. 15

Chapter 1  Introduction .................................................................................................................. 16

1.1 Chapter Introduction ........................................................................................................ 16

1.2 An introduction to the eating disorders ............................................................................ 16

1.3 Diagnostic criteria ............................................................................................................ 17

1.3.1 Diagnostic criteria for anorexia nervosa .............................................................. 18

1.3.2 Diagnostic criteria for bulimia nervosa ............................................................... 21

1.3.3 Diagnostic criteria for other specified feeding or eating disorders .................. 26

1.3.4 Subclinical eating disorders ............................................................................... 29

1.3.5 Diagnosis and categorisation of eating disorders in athletes ............................. 30

1.3.6 Anorexia Athletica ............................................................................................. 30

1.3.7 The Female Athlete Triad.................................................................................... 31

1.3.8 Muscle Dysmorphia ......................................................................................... 33

1.3.9 Limitations of diagnostic criteria and the transdiagnostic approach .......... 34

1.3.10 Summary: Classification of eating psychopathology ...................................... 36

1.4 Prevalence of eating disorders .......................................................................................... 36

1.4.1 Prevalence of eating disorders in the general population................................ 36

1.4.2 Prevalence of subclinical conditions .................................................................. 37

1.4.3 Prevalence of eating disorders and disordered eating in athletes ................. 37

1.4.4 Summary: Prevalence of eating psychopathology in athletes ....................... 44

1.5 Generic risk factors for eating disorders ........................................................................ 45

1.6 Exercise and the eating disorders ..................................................................................... 47

1.6.1 The role of exercise in the eating disorders: development and maintenance .... 47

1.6.2 A model of compulsive exercise ....................................................................... 48

1.6.3 Summary: Risk factors for eating disorders in the general population .......... 49

1.7 Sports specific risk factors for eating disorders in athletes .......................................... 51

1.7.1 Peer influences .................................................................................................... 51

1.7.2 Traumatic experiences ....................................................................................... 51
## Table of Contents

1.7.3 Personality factors.................................................................................................... 52  
1.7.4 Coach attitudes and behaviours............................................................................ 52  
1.7.5 Weight monitoring practices ................................................................................ 53  
1.7.6 Attitude towards weight ....................................................................................... 54  
1.7.7 Summary: Risk factors for eating disorders in athletes......................................... 54  

1.8 Treatment and management of eating disorders............................................................... 55  
1.8.1 Eating disorder disclosure .................................................................................... 55  
1.8.2 Treatment of eating disorders: .............................................................................. 55  
1.8.3 Outcome of eating disorders ............................................................................... 57  
1.8.4 Summary: Treatment and management of eating disorders .................................. 58  

1.9 Role of the coach in identifying and managing eating problems in athletes ............... 58  
1.9.1 Coach knowledge of eating problems ................................................................... 58  
1.9.2 Coaches and the identification of eating disorders .............................................. 59  
1.9.3 Qualitative research with coaches ....................................................................... 60  
1.9.4 Summary: The role of the coach in identifying and managing eating problems in athletes 60  

1.10 Experiences of eating disorders in sport...................................................................... 61  
1.10.1 Summary: Experiences of athletes with eating problems..................................... 67  

1.11 Conclusions .............................................................................................................. 68  

1.12 Broad aims of the thesis .......................................................................................... 69  
1.13 Specific aims of the thesis: Links with studies (Figure 1.6). ....................................... 71  

Chapter 2 General Methodology.......................................................................................... 73  
2.1 Introduction .............................................................................................................. 73  
2.2 Design ...................................................................................................................... 73  
2.3 Ethical considerations ............................................................................................... 74  
2.4 Participants .............................................................................................................. 74  
2.4.1 Inclusion and exclusion criteria for all participants ............................................. 74  
2.4.2 Recruitment procedure: Non-clinical athletes and controls .................................. 75  
2.4.3 Recruitment: Coaches ....................................................................................... 76  
2.4.4 Recruitment: Athletes with current eating disorders .......................................... 76  

2.5 Quantitative measures ............................................................................................... 78  
2.5.1 Demographic questionnaires .............................................................................. 78  
2.5.2 Measures of eating disorder behaviours and cognitions .................................... 79  
2.5.3 Measures of exercise attitudes and beliefs ......................................................... 86  

2.5.4 Measures of emotion regulation ......................................................................... 89  

2.6 General procedure for quantitative studies.................................................................. 92  
2.7 Quantitative Data analysis........................................................................................ 92  
2.7.1 Preliminary data cleaning and analysis ................................................................. 92
### Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7.2 Subsequent data analyses</td>
<td>92</td>
</tr>
<tr>
<td>2.8 Qualitative methods</td>
<td>93</td>
</tr>
<tr>
<td>2.8.1 Justification of the research method</td>
<td>93</td>
</tr>
<tr>
<td>2.8.2 Philosophical position</td>
<td>94</td>
</tr>
<tr>
<td>2.8.3 Qualitative data collection: Semi structured interviews</td>
<td>95</td>
</tr>
<tr>
<td>2.9 Data Analysis</td>
<td>96</td>
</tr>
<tr>
<td>2.10 Conclusions</td>
<td>99</td>
</tr>
</tbody>
</table>

**Part 2: What is the link between exercise attitudes and eating psychopathology in athletes, and how can we measure it?** ................................................................. 100

**Chapter 3** Use of the Compulsive Exercise Test with athletes: Norms and links with eating psychopathology ................................................................. 101

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Introduction</td>
<td>101</td>
</tr>
<tr>
<td>3.2 Study 1: Use of the Compulsive Exercise Test with Athletes: Norms and links with eating psychopathology</td>
<td>102</td>
</tr>
</tbody>
</table>

**Chapter 4** Validity of the Compulsive Exercise Test in screening for eating psychopathology among competitive athletes ......................................................... 119

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Introduction</td>
<td>119</td>
</tr>
<tr>
<td>4.2 Study 2: Validity of the Compulsive Exercise Test in screening for eating psychopathology among competitive athletes</td>
<td>120</td>
</tr>
</tbody>
</table>

**Chapter 5** Links between emotion regulation and eating psychopathology in competitive athletes and non-athletes: The mediating role of compulsive exercise ........................................ 135

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Introduction</td>
<td>135</td>
</tr>
<tr>
<td>5.2 Study 3: Links between emotion regulation and eating psychopathology in competitive athletes and non-athletes: The mediating role of compulsive exercise</td>
<td>136</td>
</tr>
</tbody>
</table>

**Part 3: How do coaches currently identify and manage eating problems in athletes?** ................................................................. 154

**Chapter 6** Identifying and preventing disordered eating among athletes: Perceptions of track and field coaches ................................................................. 155

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 Introduction</td>
<td>155</td>
</tr>
<tr>
<td>6.2 Identifying and preventing disordered eating among athletes: Perceptions of track and field coaches</td>
<td>156</td>
</tr>
</tbody>
</table>

**Chapter 7** Responses of track and field coaches with eating problems ........................................................................ 173

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Introduction</td>
<td>173</td>
</tr>
<tr>
<td>7.2 Study 5: Responses of track and field coaches to athletes with eating problems</td>
<td>174</td>
</tr>
</tbody>
</table>

**Part 4: How do athletes experience eating disorders?** ....................................................................... 192

**Chapter 8** Disclosure experiences of athletes with eating disorders ........................................................................ 193

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1 Introduction</td>
<td>193</td>
</tr>
<tr>
<td>8.2 Study 6: Disclosure experiences of athletes with eating disorders</td>
<td>194</td>
</tr>
</tbody>
</table>

**Chapter 9** Athletes with eating disorders: Experiences of seeking and receiving treatment .......... 208

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1 Introduction</td>
<td>208</td>
</tr>
<tr>
<td>9.2</td>
<td>Study 7: Athletes with eating disorders: Experiences of seeking and receiving treatment</td>
</tr>
</tbody>
</table>

Chapter 10  General Discussion................................................................. 224

10.1  Introduction.......................................................................................... 224

10.2  Aims of this thesis.................................................................................. 224

10.3  Summary of results................................................................................. 225

10.3.1  Studies 1, 2 and 3: Compulsive exercise and eating psychopathology in the athlete population.................................................................................. 225

10.3.2  Studies 4 and 5: Methods employed by coaches in identifying and managing eating problems in athletes......................................................... 226

10.3.3  Studies 6 and 7: Athlete experiences of disclosing an eating disorder, and in seeking and receiving treatment. ......................................................... 227

10.4  Contribution of the results to the understanding of eating psychopathology in athletes 228

10.4.1  Compulsive exercise and eating psychopathology in athletes .......... 228

10.4.2  Compulsive exercise as a maladaptive strategy of mood regulation ...... 229

10.4.3  Identification and disclosure of eating problems in athletes .................. 233

10.4.4  Management and treatment of eating disorders in athletes .................. 234

10.5  Strengths of the present thesis............................................................... 235

10.6  Limitations of the present thesis............................................................. 237

10.6.1  The effect of depression, anxiety and perfectionsim............................. 237

10.6.2  Self report and cross-sectional data......................................................... 237

10.6.3  Recruitment and sample biases............................................................... 238

10.7  Future directions for research investigating eating psychopathology in athletes ................................................................. 239

10.7.1  Longitudinal research into compulsive exercise and eating psychopathology ..... 239

10.7.2  Sample.................................................................................................... 239

10.7.3  Outcomes of athletes with eating psychopathology .................................. 240

10.7.4  Coach education efficacy and impact......................................................... 240

10.8  Implications of the present thesis............................................................. 240

10.9  Conclusions.............................................................................................. 242

References....................................................................................................... 244

Appendices........................................................................................................ 285

Appendix A: Ethical Approval (NHS)............................................................... 285

Appendix B: Ethical Approval (Institution)......................................................... 288

Appendix C: Example Information Sheet and Consent Form............................ 289

Appendix D: Eating Disorder Examination Questionnaire - Version 6.0........... 295

Appendix E: Compulsive Exercise Test (Athlete Version).................................. 299

Appendix F: Difficulties in Emotion Regulation Scale........................................ 301

Appendix G: Athlete & Control Demographic Questionnaire........................... 304

Appendix H: Coach Demographic Questionnaire.............................................. 306
<table>
<thead>
<tr>
<th>Appendix I: The Compulsive Exercise Test (CET)</th>
<th>308</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix J: Reflective diary (Studies 4 and 5)</td>
<td>311</td>
</tr>
<tr>
<td>Appendix K: Reflective Diary (Studies 6 and 7)</td>
<td>318</td>
</tr>
<tr>
<td>Appendix L: Interview Schedule (Studies 4 and 5)</td>
<td>324</td>
</tr>
<tr>
<td>Appendix M: Interview Schedule (Studies 6 and 7)</td>
<td>326</td>
</tr>
<tr>
<td>Appendix N: Audit trail - Transcription, themes &amp; subthemes (Studies 4 &amp; 5)</td>
<td>327</td>
</tr>
<tr>
<td>Appendix O: Audit Trail – Transcription, themes &amp; subthemes (Studies 6 &amp; 7)</td>
<td>331</td>
</tr>
</tbody>
</table>
Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN</td>
<td>Anorexia Nervosa</td>
</tr>
<tr>
<td>APA</td>
<td>American Psychiatric Association</td>
</tr>
<tr>
<td>BED</td>
<td>Binge eating disorder</td>
</tr>
<tr>
<td>BN</td>
<td>Bulimia Nervosa</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>CET</td>
<td>Compulsive Exercise Test</td>
</tr>
<tr>
<td>CET-A</td>
<td>Compulsive Exercise Test (Athlete version)</td>
</tr>
<tr>
<td>DERS</td>
<td>Difficulties in Emotion Regulation Scale</td>
</tr>
<tr>
<td>DSM</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
</tr>
<tr>
<td>EDNOS</td>
<td>Eating Disorders Not Otherwise Specified</td>
</tr>
<tr>
<td>EDE</td>
<td>Eating Disorders Examination</td>
</tr>
<tr>
<td>EDE-Q</td>
<td>Eating Disorder Examination Questionnaire</td>
</tr>
<tr>
<td>GP</td>
<td>General practitioner</td>
</tr>
<tr>
<td>ICD-10</td>
<td>The International Statistical Classification of Disease and Related Problems (10th Revision)</td>
</tr>
<tr>
<td>NHS</td>
<td>National Health Service</td>
</tr>
<tr>
<td>OBE</td>
<td>Objective bulimic episode</td>
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<tr>
<td>SD</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>UKA</td>
<td>UK Athletics</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
</tr>
</tbody>
</table>
List of Figures

Figure 1.1 ICD-10 Anorexia nervosa differential diagnosis & atypical anorexia nervosa criteria  . 21
Figure 1.2 ICD-10 Bulimia nervosa differential diagnosis & atypical bulimia nervosa criteria .... 24
Figure 1.3 Spectrum of eating attitudes and behaviours .......................................................... 30
Figure 1.4 Multidimensional model of compulsive exercise (Meyer et al., 2011) .................. 50
Figure 1.5 Factors influencing eating psychopathology in athletes to be explored in this thesis .... 70
Figure 1.6 Focus and studies of the present thesis ................................................................. 72
Figure 3.1 Path diagram for the original five factor model of the Compulsive Exercise Test .... 109
Figure 5.1 Mediation relationship between DERS subscales and EDE-Q Global Score when controlling for CET Avoidance among athletes ................................................................. 150
Figure 6.1 Recommendations for coach education on disordered eating in athletes ............ 172
Figure 7.1 Disordered eating scenario .................................................................................... 179
Figure 9.1 Influences on the treatment & recovery process among athletes with eating disorders 214
Figure 9.2 Recommendations for supporting intervention and treatment for athletes with eating disorders .................................................................................................................. 223
Figure 10.1 The original multidimensional compulsive exercise model (Meyer et al., 2011) .... 231
Figure 10.2 A modified multidimensional compulsive exercise model for athletes ............... 232
List of Tables

Table 1.1 Criteria for anorexia nervosa as per DSM-IV, DSM-5 (APA 2000; 2013) and ICD-10 (WHO, 2010). ................................................................................................................................... 19

Table 1.2 Criteria for bulimia nervosa as specified by the DSM-IV, DSM-5 (APA, 2000; 2013) and ICD-10 (WHO, 2010). ..................................................................................................................... 22

Table 1.3 Criteria for binge eating disorder (DSM-IV and DSM-5; APA 2000; 2013)................... 25

Table 1.4 DSM and ICD criteria for residual categories (DSM-IV; DSM-5; APA 2000; 2013; ICD-10, WHO, 2010). .............................................................................................................................. 27

Table 1.5 Prevalence of eating disorders and disordered eating amongst athlete groups, as determined by studies using a clinical interview................................................................. 39

Table 1.6 Qualitative research exploring eating disorders & disordered eating among athletes .... 62

Table 3.1 Pattern matrix of Compulsive Exercise Test items ........................................................ 112

Table 3.2 Athlete norms for the five factor and three factor Compulsive Exercise Test subscales 113

Table 3.3 Stepwise regression analysis predicting eating psychopathology scores from three factor Compulsive Exercise Test scores in athletes.................................................................................. 115

Table 4.1 Mean scores on the Eating Disorder Examination Questionnaire and the Compulsive Exercise Test (athlete version) for the eating disorder cases (n = 15) and non-cases (n = 532) ... 126

Table 4.2 Mean scores on the Eating Disorder Examination Questionnaire and the Compulsive Exercise Test (athlete version) for male (n = 217) and female (n = 330) athletes. ........................ 127

Table 4.3 Two-tailed Spearman’s Rho correlations between the Eating Disorder Examination Questionnaire and Compulsive Exercise Test (athlete version) for male (n = 217) and female (n = 330) athletes. .................................................................................................................................. 128

Table 4.4 Sensitivity and specificity of the CET-A in distinguishing athletes with and without a current eating disorder............................................................................................................. 130

Table 4.5 Characteristics of the groups scoring positively (n = 128) and negatively (n = 419) on the Global CET-A (employing the proposed cut-off of 10.00).......................................................... 131

Table 5.1 Demographic characteristics of athletes (n = 262) and non-athletes (n = 237) in the sample ........................................................................................................................................... 140
Table 5.2 Means, standard deviations and Mann Whitney U test of difference scores for CET-A, DERS and EDE-Q scores between athletes (n = 262) and non-athletes (n = 237) ....................... 144

Table 5.3 Means, standard deviations and Mann Whitney U test of difference scores for CET-A, DERS and EDE-Q scores between males (n = 144) and females (n = 355). ................................. 145

Table 5.4 Unstandardised beta coefficients for the mediation models for athletes (n = 262) when controlling for gender .................................................................................................................... 147

Table 5.5 Unstandardised beta coefficients for the mediation models for non-athletes (n = 237) when controlling for gender ........................................................................................................... 149

Table 6.1 Summary of themes and subthemes from the thematic analysis .................................................. 161

Table 7.1 Participant characteristics........................................................................................................... 178

Table 8.1 Demographic characteristics by self-reported eating disorder diagnosis (n = 15) ............ 197

Table 8.2 Superordinate themes and subthemes of disclosure experiences among athletes............ 199
Part 1: An introduction to eating psychopathology in athletes

The first part of this thesis presents an overview of the eating disorder spectrum and critiques the current literature exploring eating psychopathology in the sporting context. Current methodological issues and gaps within the literature are highlighted, and the research questions that are explored within this thesis are outlined. Chapter two evaluates current methodological approaches within the field, and presents an overview of the methods adopted within this thesis. Chapter two also justifies the choice of questionnaires and qualitative methods used within this thesis. An outline of the recruitment methods and ethical consideration for the studies within this thesis are also presented.
Chapter 1  Introduction

1.1 Chapter Introduction

This chapter provides a comprehensive overview of the literature in the area of eating disorders in athletes and outlines the research questions that are addressed within this thesis. First, an overview of the eating disorders is presented, including the diagnostic criteria and classification systems that are commonly used. Second, the prevalence of, and risk factors for, eating disorders in both the general population and among athletes will be considered. Compulsive exercise is defined, and its relationship with eating psychopathology is explored. The chapter provides an overview of the treatment strategies for eating disorders, and explores the role of coach in identifying potential eating problems among athletes. Finally, experiential research that has explored eating problems in athletes is reviewed. The chapter will finish with an overview of the aims of the thesis.

1.2 An introduction to the eating disorders

Eating disorders are broadly characterised by disturbed eating habits or weight-control behaviour, which result in a “significant impairment to either physical health or psychosocial functioning” (Fairburn & Harrison, 2003). Eating disorders are complex and can manifest in a variety ways (National Institute for Clinical Excellence, 2004). Diagnostic classification criteria have specified common ways in which eating disordered attitudes and behaviours present, to assist clinicians and researchers in appropriately differentiating patients and to inform the therapeutic process (Diagnostic and Statistical Manual of Mental Disorders Version 5 (DSM-5); American Psychiatric Association, 2013; International Classification of Diseases and Related Health Problems Version 10 (ICD-10); World Health Organisation (WHO), 2010). The most common forms of eating disorder include: anorexia nervosa (AN), which is characterised by severe food restriction and weight loss; bulimia nervosa (BN), which is characterised by frequent episodes of binge eating, followed by inappropriate compensatory behaviours such as self-induced vomiting; and binge eating disorder (BED), which is characterised by episodes of uncontrolled binge eating (DSM-5, APA 2013).

Eating disorders are relatively rare among the general population, with a lifetime incidence of around 1% (Hudson, Hiripi, Harrison & Kessler, 2007). Eating disorders most commonly occur among female adolescents (Smink, van Hoeken & Hoek, 2012). Eating disorders also represent a significant issue within the sporting context, with up to 20% of female elite athletes and up to 8% of male elite athletes meeting the clinical criteria for an eating disorder (Sundgot-Borgen & Torstveit, 2004). The outcomes of eating disorders are relatively poor; just half of those with anorexia nervosa achieve a full recovery 21 years after onset (Zipfel, Lowe, Reas, Deter & Herzog,
1.3 Diagnostic criteria

There are two standard classification and diagnostic systems in use within clinical and research environments to aid the identification of eating disorders. The most commonly used system within academia is the Diagnostic and Statistical Manual of Mental Disorders (DSM), developed by the American Psychiatric Association (APA), however the International Classification of Diseases and Related Health Problems (ICD-10; WHO, 2010) is the preferred diagnostic tool within treatment centres in the UK. The most recent revision of the DSM was released in 2013 (DSM-5), which included some changes to the eating disorder classification system and diagnostic criteria. The most recent version is the ICD-10, revisions to which were released in 2010. The DSM classification tends to be more widely used than ICD-10 classification within eating disorder research (Wilfley, Bishop, Wilson & Agras, 2007). Both methods of classification are presented below.

It is important to acknowledge that classification systems are not without their drawbacks, both within the context of research and in terms of clinical utility. For example, categorising mental disorders as discrete entities can be reductionist and limiting, and does not take into account the tendency of mental disorders to co-occur and merge into one another (Wilfley et al., 2007). Indeed, research has indicated a high level of instability exists for the diagnostic categories in the eating disorders (e.g., Milos, Spindler, Schnyder, & Fairburn, 2005). In addition, the classification systems identify only those individuals with clinically significant eating disorders. A large proportion of individuals within the sporting context present with subclinical eating problems (e.g., Beals & Manore, 1994; Greenleaf, Petrie, Carter & Reel, 2009), who do not necessarily meet the criteria for a clinical eating disorder diagnosis. Those without a clinical diagnosis may not be able to access support from eating disorder services, despite a significant detrimental impact of subclinical conditions and disordered eating on their quality of life (e.g. Herpertz-Dahlmann, Wille, Holling, Vloet & Ravens-Sieberer, 2008; Touchette et al., 2011).

The proposed revisions to the DSM-V go some way to addressing these concerns, by reducing or removing frequency criteria for diagnoses of anorexia nervosa and bulimia, and by introducing an additional category of Binge Eating Disorder. It is anticipated this new category will reduce the use of the ‘Eating Disorders Not Otherwise Specified” diagnosis, which was
Introduction

previously of limited value to patients, clinicians and researchers alike, due to the wide range of eating disorder presentations that were classified within this group (Fairburn & Bohn, 2005; Moor, Vartanian, Touyz & Beumont, 2004; Turner & Bryant-Waugh, 2004).

1.3.1 Diagnostic criteria for anorexia nervosa

Anorexia nervosa (AN) is characterised by significant distortions to body image and restriction of food intake that results in severe weight loss (APA, 2013). Patients with AN also describe an intense fear of weight gain. The DSM-IV (APA, 2000), DSM-5 (APA, 2013) and ICD-10 (WHO, 2010) criteria for AN are compared and contrasted in Table 1.1. DSM-IV specified four main criteria for a diagnosis of AN, whilst DSM-5 specifies three (APA 2000; 2013) and ICD-10 specifies five (WHO, 2010). Each classification criteria for AN specify a restriction of energy intake, but the criteria in DSM-IV and ICD-10 are specific as to the level of restriction and weight status (less than 85% of what is expected for age and height). The DSM-5 does not refer to a specific cut-off, but rather leaves this to clinical judgement for each individual, whereby their past history and weight status can be taken into consideration (Mitchell, Cook-Myers & Wonderlich, 2005). In addition, the notion of food ‘refusal’ has been removed from the criteria for DSM-5, as it was considered that this could indicate intent on the part of the patient, which was difficult to determine (APA, 2013). A second major difference between the criteria is the inclusion of amenorrhea (an absence of at least three consecutive menstrual cycles), which was specified in DSM-IV (APA, 2000) and ICD-10 (WHO, 2010). This criterion has been removed in the DSM-5 due to concerns that it was not relevant to all patients, notably males, pre-menarchal females and females taking the oral contraceptive. ICD-10 presents amenorrhea as just one symptom of endocrine disruption, and provides criteria for male patients on this axis (ICD-10, WHO, 2010). Importantly, research has indicated that amenorrhea is not a critical criterion for a diagnoses of AN, as some patients will continue to menstruate even at a very low weight (Cachelin & Maher, 1998; Garfinkel et al., 1996). This highlights a need to explore additional features of endocrine disruption such as thyroid metabolism, and elevated levels of cortisol and growth hormone (Garfinkel et al., 1996). ICD-10 also provides guidance with regards to the presentation of AN prior to puberty, and distinguishes between the presentation of the disorder among males and females; aspects which are relatively neglected by both versions of the DSM.
Table 1.1 Criteria for anorexia nervosa as per DSM-IV, DSM-5 (APA 2000; 2013) and ICD-10 (WHO, 2010).

<table>
<thead>
<tr>
<th>DSM-IV criteria (AN)</th>
<th>DSM-5 criteria (AN)</th>
<th>ICD-10 criteria (AN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Refusal to maintain body weight at or above a minimally normal weight for age and height (i.e. lower than 85% normal weight for age)</td>
<td>A. Restriction of energy intake leading to a significantly low body weight in the context of age, sex, developmental trajectory and physical health</td>
<td>A. Body weight is maintained at least 15% below that expected (either lost or never achieved), or Quetelet’s BMI is 17.5 or less (if over 16 years). Prepubertal patients may show failure to make the expected weight gain during the period of growth.</td>
</tr>
<tr>
<td>B. Intense fear of gaining weight or becoming fat, despite being underweight.</td>
<td>B. Intense fear of gaining weight or becoming fat, even though underweight.</td>
<td>B. The weight loss is self-induced by avoidance of ‘fattening foods’. One or more of the following may also be present: self-induced vomiting or purging, excessive exercise, use of appetite suppressants and/or diuretics.</td>
</tr>
<tr>
<td>C. Disturbance in perception of body weight or shape, undue influence of body weight or shape on self-evaluation and denial of seriousness of current low body weight.</td>
<td>C. Disturbance in the way in which one’s body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of current low body weight.</td>
<td>C. There is body-image distortion in the form of a specific psychopathology whereby a dread of fatness persists as an intrusive, overvalued idea, and the patient imposes a low weight threshold on himself or herself.</td>
</tr>
<tr>
<td>D. In postmenarcheal females, the absence of three or more consecutive menstrual cycles (amenorrhea).</td>
<td>D. Specify type: Restricting type (during the last three months, the person has not engaged in recurrent binge-eating or purging behaviour) Binge-eating or purging type (the person has engaged in recurrent episodes of binge-eating or purging behaviour such as self-induced vomiting, the misuse of laxatives, diuretics or enemas).</td>
<td>D. A widespread endocrine disorder involving the hypothalamic – pituitary – gonadal axis is manifest in women as amenorrhea and in men as a loss of sexual interest and potency. (An apparent exception is the persistence of vaginal bleeds in anorexic women who are receiving replacement hormone therapy, most commonly taken as a contraceptive pill). There may also be elevated levels of growth hormone, increased levels of cortisol, changes in the peripheral metabolism of the thyroid hormone and abnormalities of insulin secretion.</td>
</tr>
<tr>
<td>E. Specify type for current episode: Restricting type (the person has not regularly engaged in binge-eating or purging behaviour) Binge-eating or purging type (the person has regularly engaged in binge-eating or purging behaviour such as self-induced vomiting, the misuse of laxatives).</td>
<td></td>
<td>E. If onset is prepubertal, the sequence of pubertal events is delayed or even arrested (growth ceases, in girls the breasts do not develop and there is primary amenorrhea; in boys, the genitals remain juvenile). With recovery, puberty is often completed normally, but the menarche is late.</td>
</tr>
</tbody>
</table>
The DSM-IV requires specific subtypes of AN to be defined for each episode, with two subtypes specified: restricting and binge-eating/purging. Patients do not engage in binge eating episodes, or indeed any form of compensatory behaviour, such as self-induced vomiting, the misuse of laxatives or compensatory exercise behaviour in the restricting form of AN. In contrast, the binge eating/purging subtype characterises a patient who engages in restrictive episodes, but these are punctuated by tendencies to binge eat, followed by some form of compensatory behaviour. The cycle of restriction followed by binging and purging is specified as ‘regular’ in the DSM-IV. The subtypes of AN have been comprehensively explored in research (e.g., Casper & Troiani, 2001; Da Costa & Halmi, 1992; Pryor, Wiederman & McGilley, 1996; Tanaka et al., 2003), and there is evidence to suggest that the distinction is valid and useful, both in terms of the etiology and course of the disorder, and in terms of the clinical presenting features. However, the subtypes were previously assigned for each episode of AN, hence a high proportion of patients were found to transfer between subtypes over the course of their disorder, with only a small percentage of patients never reporting regular binge/purge behaviours (Eddy et al., 2002). Whilst the subtypes are still present in the DSM-5 criteria, the timeframe has been adapted to three months, to ensure that the subtype reflects the consistently presenting features of the disorder.

In contrast, ICD-10 does not specify different types of AN. It does, however, provide information with regards to the differential diagnoses, which are listed in Figure 1.1. ICD-10 also includes a diagnostic category of ‘Atypical Anorexia Nervosa’, which aims to capture those individuals who do not necessarily meet the weight or amenorrhea criteria, or those with only mild symptoms of the disorder.
Introduction

Figure 1.1 ICD-10 Anorexia nervosa differential diagnosis & atypical anorexia nervosa criteria

<table>
<thead>
<tr>
<th>Differential diagnosis anorexia nervosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential diagnosis anorexia nervosa</td>
</tr>
<tr>
<td>There may be associated depressive or obsessional symptoms, as well as features of a personality disorder, which may make differentiation difficult and/or require the use of more than one diagnostic code.</td>
</tr>
<tr>
<td>Somatic causes of weight loss in young patients that must be distinguished include chronic debilitating diseases, brain tumors, and intestinal disorders such as Crohn's disease or a malabsorption syndrome</td>
</tr>
<tr>
<td>Atypical anorexia nervosa</td>
</tr>
<tr>
<td>This term should be used for those individuals in whom one or more of the key features of anorexia nervosa, such as amenorrhoea or significant weight loss, is absent, but who otherwise present a fairly typical clinical picture.</td>
</tr>
<tr>
<td>Such people are usually encountered in psychiatric liaison services in general hospitals or in primary care. Patients who have all the key symptoms but to only a mild degree may also be best described by this term. This term should not be used for eating disorders that resemble anorexia nervosa but that are due to known physical illness.</td>
</tr>
</tbody>
</table>

1.3.2 Diagnostic criteria for bulimia nervosa

Bulimia nervosa (BN) is characterised by frequent episodes of binge eating, followed by inappropriate behaviours such as self-induced vomiting to avoid weight gain (APA, 2000; 2013). The criteria as specified for DSM-IV, DSM-5 and ICD-10 are shown in Table 1.2. The classification criteria for the binge eating episodes of BN focus on consuming a significantly larger amount of food than most other people would eat during the same time period. In addition, these episodes are ‘irresistible’ (ICD-10) or associated with a ‘loss of control’ (DSM-IV and DSM-5). The three classification systems also specify that episodes of binge eating should be followed by inappropriate compensatory behaviours. This might include self-induced vomiting, fasting, or misuse of medications such as laxatives. The DSM-IV and V include criteria that self-esteem and self-worth are unduly influenced by a person’s perception of their shape and weight (APA, 2010; 2013) whilst the ICD-10 specifies strict weight targets and thresholds (WHO, 2010). ICD-10 also specifies the possibility of an earlier phase of anorexia nervosa, whilst the DSM-IV and DSM-5 specify that bulimic binge-purge episodes must not occur exclusively during episodes of anorexia nervosa, in order to distinguish from the binge-purge subtype of anorexia nervosa (APA, 2000; 2013).
Table 1.2 Criteria for bulimia nervosa as specified by the DSM-IV, DSM-5 (APA, 2000; 2013) and ICD-10 (WHO, 2010).

<table>
<thead>
<tr>
<th>DSM-IV criteria (BN)</th>
<th>DSM-5 criteria (BN)</th>
<th>ICD-10 criteria (BN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Recurrent episodes of binge eating, which is characterised by both of the following: (a) eating in a discrete amount of time (e.g. 2 hours) an amount of food that is definitely larger than most people would eat during a similar time period and under similar circumstances and (b) A sense of a lack of control over eating during the episode (e.g. feeling unable to stop or control what one is eating).</td>
<td>A. Recurrent episodes of binge eating, which is characterised by both of the following: (a) Eating in a discrete amount of time (e.g. 2 hours) an amount of food that is definitely larger than most people would eat during a similar time period and under similar circumstances and (b) A sense of a lack of control over eating during the episode (e.g. feeling unable to stop or control what one is eating).</td>
<td>A. There is a persistent preoccupation with eating, and an irresistible craving for food; the patient succumbs to episodes of overeating in which large amounts of food are consumed in short periods of time.</td>
</tr>
<tr>
<td>B. Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics or other medications, fasting, or excessive exercise.</td>
<td>B. Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics or other medications, fasting, or excessive exercise.</td>
<td>B. The patient attempts to counteract the ‘fattening’ effects of food by one or more of the following: self-induced vomiting, purgative abuse, alternating periods of starvation, use of drugs as appetite suppressants, thyroid preparations or diuretics. When bulimia occurs in diabetic patients, they may choose to neglect their insulin treatment.</td>
</tr>
<tr>
<td>C. Binge eating and inappropriate compensatory behaviours both occur, on average, at least twice a week for three months.</td>
<td>C. Binge eating and inappropriate compensatory behaviours both occur, on average, at least once a week for three months.</td>
<td>C. The psychopathology consists of a morbid dread of fatness and the patient sets themselves a sharply defined weight threshold, well below that which consists the optimum in the opinion of the physician. There is often a history of an earlier episode of AN, the interval ranging between a few months to several years. This earlier episode may have been fully expressed, or have assumed a minor cryptic form with a moderate loss of weight and/or a transient phase of amenorrhea.</td>
</tr>
<tr>
<td>D. Self-evaluation is unduly influence by body shape and weight</td>
<td>D. Self-evaluation is unduly influence by body shape and weight</td>
<td>E. The disturbance does not occur exclusively during episodes of anorexia nervosa.</td>
</tr>
<tr>
<td>E. The disturbance does not occur exclusively during episodes of anorexia nervosa.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Specify type: <strong>Purging type:</strong> Current episode includes regular self-induced vomiting, laxatives, diuretics or enemas. <strong>Non-purging type:</strong> Current episode includes fasting or excessive exercise, but not self-induced vomiting, laxatives, diuretics or enemas.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Introduction**
The revisions to the criteria for DSM-5 are in relation to the frequency criteria that were previously specified for the binge/purge episodes. The DSM-IV criteria specified that these episodes should occur at least twice per week. However, this has been reduced to just once per week in the new DSM-5 criteria (APA, 2000; 2013). This is due to research indicating little or no difference in the clinical characteristics of those purging once or twice per week (Wilson & Sysko, 2009). Reducing the frequency criteria also does not lead to a marked increase in the lifetime prevalence of BN (Trace et al., 2012). Indeed, ICD-10 does not specify the frequency of binge/purge episodes at all.

Two subtypes of bulimia nervosa were also presented in DSM-IV; purging and non-purging (APA, 2000). These two variants aimed to distinguish patients according to the type of compensatory behaviours. A diagnosis of the purging subtype of BN was assigned to patients exhibiting purging behaviours of self-induced vomiting and/or misuse of laxatives or diuretics, regardless of whether the patient also engaged in excessive exerciser and/or restriction. Conversely, the non-purging subtype diagnosis was given where only restriction and/or excessive exercise behaviours were reported, but not other compensatory behaviours. Changes in the DSM-5 have resulted in the removal of the subtyping criteria, which has been replaced with a single diagnosis that includes both purging (e.g. self-induced vomiting, use of diuretics and laxatives) and non-purging (excessive exercise and fasting) compensatory behaviours (APA, 2013; Mond, 2013).

Initial suggestions specified that the non-purging elements of BN would be removed completely (such as fasting and excessive exercise), due to a close resemblance with those with binge eating disorder (BED; Mond, 2013). However, evidence suggested a distinct element to the non-purging subtype (Jordan et al., 2014) in comparison to both the purging and BED categories, and the importance of the fasting and excessive exercise elements were acknowledged. Hence, reference to both forms of compensatory behaviours has been retained in the final version of DSM-5 (APA, 2013). Notably, ICD-10 does not include subtyping criteria and does not include excessive exercise as a compensatory mechanism.

ICD-10 specifies differential diagnoses of gastrointestinal, personality and depressive disorders (Figure 1.2). It also includes an atypical bulimia nervosa category, which accounts for patients who are of normal or above normal weight.
Figure 1.2 ICD-10 Bulimia nervosa differential diagnosis & atypical bulimia nervosa criteria

**Differential diagnosis bulimia nervosa**

Bulimia should be differentiated from:

a) upper gastrointestinal disorders leading to repeated vomiting (the characteristic psychopathology is absent);

b) a more general abnormality of personality (the eating disorder may coexist with alcohol dependence and petty offenses such as shoplifting);

c) depressive disorder (bulimic patients often experience depressive symptoms).

**Atypical bulimia nervosa**

This term should be used for those individuals in whom one or more of the key features listed for bulimia nervosa is absent, but who otherwise present a fairly typical clinical picture. Most commonly this applies to people with normal or even excessive weight but with typical periods of overeating followed by vomiting or purging.

Partial syndromes together with depressive symptoms are also not uncommon, but if the depressive symptoms justify a separate diagnosis of a depressive disorder two separate diagnoses should be made.

In the fourth edition of the DSM, binge eating disorder (BED) was recognised within the category of Eating Disorders Not Otherwise Specified (EDNOS) and termed ‘clinically significant’ (APA, 2000), however it did not constitute a separate diagnostic category like the two main eating disorders. Instead, the condition was introduced and identified as an area requiring further investigation, prior to inclusion as a full diagnostic category (APA, 2000). The provisional diagnostic criteria suggested in DSM-IV, and the criteria included in the DSM-5 are shown in Table 1.3 (APA, 2000; 2013). ICD-10 does not include BED as a separate category. It does, however specify a category of “Overeating associated with other psychological disturbances”. ICD-10 specifies overeating as a result of distressing events is to be coded in this category; however there is not a comprehensive category of binge eating behaviour as presented within the DSM-5 (APA, 2013).
Table 1.3 Criteria for binge eating disorder (DSM-IV and DSM-5; APA 2000; 2013).

<table>
<thead>
<tr>
<th>DSM-IV proposed criteria (BED)</th>
<th>DSM-5 criteria (BED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Recurrent episodes of binge eating, which is</td>
<td>A. Recurrent episodes of binge eating, which is</td>
</tr>
<tr>
<td>characterised by both of the following:</td>
<td>characterised by both of the following:</td>
</tr>
<tr>
<td>(a) eating in a discrete amount of time (e.g. 2 hours) an amount</td>
<td>(a) Eating in a discrete amount of time (e.g. 2 hours)</td>
</tr>
<tr>
<td>of food that is definitely larger than most people would eat</td>
<td>an amount of food that is definitely larger</td>
</tr>
<tr>
<td>during a similar time period and under similar circumstances and</td>
<td>than most people would eat during a similar time</td>
</tr>
<tr>
<td>(b) a sense of a lack of control over eating during the episode</td>
<td>period and under similar circumstances and</td>
</tr>
<tr>
<td>(e.g. feeling unable to stop or control what one is eating).</td>
<td>(b) A sense of a lack of control over eating during the</td>
</tr>
<tr>
<td></td>
<td>episode (e.g. feeling unable to stop or control what</td>
</tr>
<tr>
<td></td>
<td>one is eating).</td>
</tr>
<tr>
<td>B. The binge eating episodes are associated with</td>
<td>B. The binge eating episodes are associated with three</td>
</tr>
<tr>
<td>three or more of the following:</td>
<td>or more of the following:</td>
</tr>
<tr>
<td>(a) Eating much more rapidly than normal</td>
<td>(a) Eating much more rapidly than normal</td>
</tr>
<tr>
<td>(b) Eating until feeling uncomfortably full</td>
<td>(b) Eating until feeling uncomfortably full</td>
</tr>
<tr>
<td>(c) Eating large amounts of food when not feeling</td>
<td>(c) Eating large amounts of food when not feeling</td>
</tr>
<tr>
<td>physically hungry</td>
<td>physically hungry</td>
</tr>
<tr>
<td>(d) Eating alone because of feeling embarrassed by how much one</td>
<td>(d) Eating alone because of feeling embarrassed by how</td>
</tr>
<tr>
<td>is eating</td>
<td>much one is eating</td>
</tr>
<tr>
<td>(e) Feeling disgusted with oneself, depressed or very</td>
<td>(a) Feeling disgusted with oneself, depressed or very</td>
</tr>
<tr>
<td>guilty after overeating.</td>
<td>guilty after overeating.</td>
</tr>
<tr>
<td>C. Marked distress regarding binge eating is present.</td>
<td>C. Marked distress regarding binge eating is present.</td>
</tr>
<tr>
<td>D. The binge eating occurs, on average, at least 2 days</td>
<td>D. The binge eating occurs, on average, at least once a</td>
</tr>
<tr>
<td>a week for 6 months.</td>
<td>week for 3 months.</td>
</tr>
<tr>
<td>E. The binge eating is not associated with the regular use of</td>
<td>E. The binge eating is not associated with the recurrent</td>
</tr>
<tr>
<td>inappropriate compensatory behaviours (e.g. purging, fasting,</td>
<td>use of inappropriate compensatory behaviour, and does</td>
</tr>
<tr>
<td>excessive exercise), and does not occur exclusively during the</td>
<td>not occur exclusively during the course of anorexia</td>
</tr>
<tr>
<td>course of anorexia nervosa or bulimia nervosa.</td>
<td>nervosa or anorexia nervosa.</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
The definition of binge eating episodes for BED in DSM-5 is identical to that of BN; i.e., eating an unusually large amount of food in a specific time frame, which is associated with a lack of control. However, the original frequency criteria proposed in DSM-IV suggested that binge eating episodes had to occur on at least two days per week, over the course of six months (as opposed to three months, as specified for BN; APA, 2000). On inclusion of BED as a separate diagnostic category in DSM-5, these frequency criteria have been brought in line with those specified for BN. As shown in Table 1.3, the criteria specify that binge episodes occur at least once per week for a minimum of three months. These reductions to the frequency of the binge eating episodes were accepted as they did not have an impact on the clinical significance of the disorder (Mond, 2013; Wilson & Sysko, 2009).

The separate category of BED was included in DSM-5 for several reasons. First, the category serves to distinguish binge eating from the relatively common phenomena of overeating (APA, 2013), and to recognise the clinical severity of the psychological and physical elements of the condition. Research has also suggested that the inclusion of a separate diagnostic category for BED in the DSM-5 is likely to significantly reduce the proportion of eating disorder patients who are assigned to the EDNOS category, as these patients can now be classified as BED (Striegel-Moore & Franko, 2007; Wilfley et al., 2007). It is recognised, however, that the BED criteria may require further revisions, as limited empirical research in this area currently exists (Mond, 2013).

1.3.3 Diagnostic criteria for other specified feeding or eating disorders

The fourth edition of the DSM included a residual category of ‘Eating Disorders Not Otherwise Specified (EDNOS). This category was originally included to assign those patients who did not meet the relatively strict criteria of the two main eating disorders, AN and BN (APA, 2000). Importantly, these patients were not assigned to the residual category to indicate eating disorders of lower clinical severity; there is evidence to suggest that those included within the EDNOS category still demonstrate severely disturbed eating behaviours and attitudes (Fairburn et al., 2007; Schmidt et al., 2008; Thomas, Vartanian & Brownell, 2009; Turner & Waugh, 2004). DSM-IV incorporated the atypical presentations of AN and BN within this category. For example, this would include patients who met all other criteria for anorexia nervosa but their weight was still in the normal range, or those who did not meet the frequency or duration criteria for binge-purge episodes in bulimia nervosa (see Table 1.4).

However, there were a number of issues identified with the original EDNOS category that has led to several changes to be incorporated in the DSM-5. First, a significant problem for the field was the large proportion of patients who were assigned to the EDNOS category; indeed research has suggested that up to two-thirds of eating disorder patients were previously classified as EDNOS (Fairburn et al., 2007; Turner & Waugh, 2004).
### Table 1.4 DSM and ICD criteria for residual categories (DSM-IV; DSM-5; APA 2000; 2013; ICD-10, WHO, 2010).

<table>
<thead>
<tr>
<th>DSM-IV criteria (EDNOS)</th>
<th>DSM-5 criteria (Other specified feeding or eating disorder)</th>
<th>ICD-10 atypical and residual eating disorder categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>The EDNOS category is for disorders of eating that do not meet the criteria for any specific eating disorder.</td>
<td><strong>Subthreshold BN:</strong> All of the criteria for BN are met, except that binge eating and inappropriate compensatory behaviours occur, on average, less than once a week, and/or for less than 3 months. <strong>Subthreshold BED:</strong> All of the criteria for BED are met, except that the binge eating occurs, on average, less than once a week, and/or for fewer than 3 months.</td>
<td><strong>Atypical AN:</strong> Key symptoms of AN such as amenorrhea or significant weight loss may not be met. Includes: Normal weight anorexia nervosa <strong>Atypical BN:</strong> Some of the key features of BN are absent, notably low weight status. Includes: Normal weight bulimia nervosa</td>
</tr>
<tr>
<td><strong>Examples include:</strong></td>
<td></td>
<td><strong>Overeating associated with other psychological disturbances:</strong> Overeating and obesity as a reaction to distressing events. Includes: Psychogenic overeating. <strong>Vomiting associated with other psychological disturbances:</strong> Includes: Psychogenic hyperemesis gravidarum Psychogenic vomiting</td>
</tr>
<tr>
<td>(a) All of the criteria for BN are met except that the binge eating and inappropriate compensatory mechanisms occur at a frequency of less than twice a week or for a duration of less than three months.</td>
<td><strong>Atypical AN:</strong> All of the criteria for AN are met except that despite significant weight loss, the patient’s weight is in the normal range or above the normal range.</td>
<td></td>
</tr>
<tr>
<td>(b) All of the criteria for AN are met, except the patient has regular menses</td>
<td><strong>Purging disorder:</strong> Recurrent purging behaviour to influence weight or shape, such as self-induced vomiting, misuse of laxatives, diuretics or other medications, in the absence of binge eating.</td>
<td><strong>Other eating disorders:</strong> Includes: Pica of non-organic origin in adults Psychogenic loss of appetite</td>
</tr>
<tr>
<td>(c) All of the criteria for AN are met except that despite significant weight loss, the patient’s weight is in the normal range</td>
<td><strong>Night Eating Syndrome:</strong> Recurrent episodes of night eating, as manifested by eating after awakening from sleep, or excessive food consumption after the evening meal. Associated with significant distress and/or impairment in functioning. Not better accounted for by BED, substance abuse or an effect of medication.</td>
<td><strong>Eating disorder, unspecified</strong></td>
</tr>
<tr>
<td>(d) The patient has normal body weight and regularly uses inappropriate compensatory behaviour after eating small amounts of food.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e) The patient engages in repeatedly chewing and spitting out, but not swallowing, large amounts of food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(f) Binge-eating disorder: recurrent episodes of binge eating in the absence of regular inappropriate compensatory behaviour, characteristic of BN.</td>
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</tbody>
</table>
The broad nature of the residual category gives little indication about the weight status of patients, their symptoms, or indeed the most appropriate form of treatment, given the wide variety in cases assigned to the category (Wilfley et al., 2007). The changes to the AN and BN categories, and the inclusion of the BED category take some steps towards reducing the high proportion of patients assigned to the EDNOS category. However, further changes were adopted in DSM-5 to improve the validity and specificity of the category, and to provide more useful information to clinicians and researchers with regards to the patients who are assigned to this diagnostic group (APA, 2013).

First, the category name has been altered to more accurately reflect the types of eating problems classified within this group. The category was previously entitled Eating Disorders Not Otherwise Specified (EDNOS) in DSM-IV but now reflects the inclusion of feeding disorders in DSM-5, and is thus newly entitled “Other specified feeding or eating disorder”. In addition to the atypical, sub threshold and mixed presentations of BN, AN and BED, which were previously specified in DSM-IV, DSM-5 also incorporates night eating syndrome and purging disorder as distinct eating disorders within this group. The inclusion of purging disorder and night eating syndrome as named disorders within the ‘Other specified feeding or eating disorder’ category was a result of considerable evidence in support of the clinical severity of these conditions (e.g., Keel, 2005; Keel & Striegel-Moore, 2009; O’Reardon, Peshek & Allison, 2005; Runfola et al., 2014).

A final category of ‘Unspecified feeding or eating disorder’ has also been included in DSM-5 as a residual category to incorporate other clinically significant eating disorders that are not covered elsewhere (APA, 2013). Original suggestions were to include this category within the ‘Other specified feeding or eating disorders’ (Mond et al., 2013), however it has subsequently been included as an independent category. The definition provided in DSM-5 for the unspecified feeding or eating disorder category is as such: “This is a residual category for clinically significant problems meeting the definition of a feeding or eating disorder, but not satisfying the criteria for any other disorder or condition.” It is anticipated that few patients will be assigned to this category, as a consequence of greater specificity within the ‘other’ category, the inclusion of BED as an independent diagnostic category; and the more flexible criteria for AN and BN.

The atypical variants of AN and BN are assigned their own code within ICD-10, hence these are not included within a large, catch all residual category, as was the case within the DSM-IV (APA, 2000). Indeed, ICD-10 also includes an overeating category (in constrast to the BED category within the DSM-5). There are three additional categories that account for additional atypical eating disorders, including: ‘vomiting associated with other psychological disturbances’, ‘other eating disorders’ and ‘eating disorder, unspecified’ (Table 1.4). The vomiting category encapsulates dissociative and hypochondrial disorders, whils the ‘other eating disorders’ category refers to pica (the persistent consumption of non-nutritive substances such as ice, clay, chalk and sand) and a psychogenic loss of appetite, whereby appetite is affected by stressful events. The final
Introduction

code, ‘eating disorder, unspecified’ might be considered the residual, ‘catch-all’ category within ICD-10, which covers other eating disorders that are not previously specified within the classification criteria (WHO, 2010).

1.3.4 Subclinical eating disorders

The previous section focused on the classification of clinical eating disorders. However, it is acknowledged that eating attitudes and behaviours exist on a continuum from normal eating, through to clinical eating disorders (Figure 1.3). Disordered eating behaviours and subclinical eating disorders are not as severe as the clinical eating disorders, but still represent a significant deviation away from normal eating attitudes and behaviours (Shisslak, Crago & Estes, 1995). The term ‘disordered eating’ incorporates a range of problematic eating attitudes, behaviours and body image distortions and concerns, including: restrictive eating, fasting or frequently skipping meals; the use of diet pills, laxatives, diuretics, or enemas; engaging in overeating or binge-eating behaviours; and purging behaviours, such as self-induced vomiting and excessive exercise (Nattiv et al., 2007). The frequency and severity of these behaviours do not meet clinical diagnostic criteria. Importantly, engaging in dieting and disordered eating behaviours have been found to be strongly predictive of the future onset of a clinical eating disorder (e.g. Fairburn, Cooper, Doll & Davies, 2005; Neumark-Stzainer, Wall, Larson, Eisenberg, & Loth, 2011; Patton, Selzer, Coffey, Carlin & Wolfe, 1999).

A priority of research has been to identify individuals at risk of developing an eating disorder in the very early stages, and disordered eating attitudes and behaviours represent one reliable method of doing so (e.g., Jacobi et al., 2011; Patton et al., 1999). As such, intervention programmes are often targeted at individuals who demonstrate disordered eating behaviours, in order to prevent the development of a clinically significant eating disorder (e.g., Shaw, Stice and Becker, 2009). Disordered eating is often comorbid with other mental health issues; the strongest evidence exists for depression and low mood (e.g., Jacobi et al., 2011; Leon, Fulkerson, Perry, Keel & Klump, 1999; Santos, Richards & Bleckley, 2007; Touchette et al., 2011). However, the directionality of this relationship has yet to be firmly established. In addition, disordered eating has been associated with a reduced quality of life across all dimensions, including social, physical and psychological well-being (e.g., Herpertz-Dahlmann, Wille, Holling, Vloet & Ravens-Sieberer, 2008; Leung, Ma & Russell, 2013).
1.3.5 Diagnosis and categorisation of eating disorders in athletes

The diagnostic categories and criteria previously outlined are applicable and utilised with the athletic population. However, it has been suggested that there may be differences in the presentation of eating disorders within the sporting context (e.g., Currie & Morse, 2005; Herbrich, Pfeiffer, Lehmkuhl, & Schneider, 2011; Sundgot-Borgen, 1994). Athlete specific eating disorders and related conditions are not recognised within either the DSM-5 or ICD-10 criteria for eating and feeding disorders. However, athlete specific conditions are commonly referred to within the literature to describe subclinical eating disorders among athlete groups. Anorexia athletica, muscle dysmorphia and the female athlete triad (composed of three elements, one of which is disordered eating) are examples of subclinical conditions that have been noted as particularly prevalent within the sporting context, and are consistently referred to within the scientific literature. These conditions are outlined below.

1.3.6 Anorexia Athletica

Anorexia athletica (AA) is a term used extensively within the literature investigating eating disorders amongst athletes (e.g., Bachner-Melman et al., 2006; Herbrich et al., 2011; Matejek, 1999). It was first introduced by Pugliese, Lifshitz, Grad, Fort and Marks-Katz (1983). The key features of AA are similar to anorexia nervosa, namely an extreme fear of weight gain and distorted perceptions of body weight and shape. It is acknowledged as a subclinical form of the disorder (Beals & Manore, 1994). However, whilst DSM-IV criteria for AN amongst non-athletic sufferers stipulated body weight to be less than 85% of the expected for their height, Sundgot-Borgen and Larsen (1993) suggested that athletes who weighed just 5% less than expected could be at an increased risk of eating disorders, due to an increase in muscle and a decrease in fat mass. It has been suggested that weight loss in AA is usually accomplished through excessive amounts of physical activity in addition to a normal training regime, resulting in a negative energy balance and inadequate calorie intake to meet the demands of an exercise schedule (Sundgot-Borgen & Larsen...
1993). Binge eating and the use of pathological weight control methods have also been found to be more common among athletes with AA (Sundgot-Borgen, 1994).

The notion of AA was particularly popular in the 1990s, however has declined in recent years due to a lack of agreement among researchers as to what constitutes anorexia athletica (e.g., Beals & Manore, 1994) and a shift in focus towards determining the presence of clinical eating disorders among athlete groups (e.g., Martinsen & Sundgot-Borgen, 2013; Sundgot-Borgen & Torstveit, 2004). This is arguably more useful with regards to drawing comparisons with other populations beyond the sporting context. The most notable difference between AA and AN was in relation to the weight status criteria that was previously imposed by the DSM-IV (APA, 2000). However, as this has now been removed from the DSM-5 (2013), this has resulted in some redundancy of the anorexia athletica category. In addition, the definition of AA draws attention to the over-exercising behaviour that was reported to be common among athletes with anorexic tendencies (Pugliese et al., 1983). In the past decade, exercise behaviour within the eating disorders has received considerable attention within the literature (e.g., Davis et al., 2007; Meyer, Taranis & Touyz, 2008; Mond, Hay Rodgers & Owen, 2006; Shroff et al., 2006). As such, the understanding of the relationship between exercise and eating psychopathology has improved considerably, and excessive exercise behaviours are acknowledged as a potential symptom of both AN and BN disorders. There is still only a small body of literature to have explored exercise attitudes in relation to eating behaviour specifically among athletes (e.g., Yates, Edman, Crago & Crowell, 2001). Advances of the field have therefore meant that the definition of anorexia athletica lacks relevance, and is limited in terms of furthering knowledge and treatment of disordered eating behaviours among athlete groups.

1.3.7 The Female Athlete Triad

A second subclinical condition that is commonly referred to within the eating disorders in sport literature is that of the female athlete triad (FAT). This refers to the interrelationship between bone mineral density, menstrual function and energy availability among female athletes (Nattiv et al., 2007). Athletes can be positioned along the triad spectrum, with optimum health defined as optimal energy availability, normal menstrual function and high bone mineral density. Where energy availability is reduced, this can result in changes to menstrual function, and reduced bone mineral density. The clinical end points of the female athlete triad are disordered eating (and as a consequence, significantly reduced energy availability), primary or secondary amenorrhea and osteoporosis (Nattiv et al., 2007).

Energy availability has been identified as having a crucial role in determining an athlete’s position on the spectrum. This refers to the amount of energy left available from dietary energy intake once energy for exercise has been deducted (Nattiv et al., 2007). Low energy availability therefore occurs when there is insufficient energy consumed from food to account for exercise
behaviours, over and above the energy requirements for normal daily metabolic processes. Insufficient energy availability can leave athletes vulnerable to hormonal disruption due to energy conservation by the body, and the reproductive system may then be ‘switched off’ (Thompson & Sherman, 2010). The prevalence of low energy availability among athletes is difficult to determine, but there has been suggestions that only a small percentage of athletes consume significant carbohydrate and energy intake (Hinton, Sanford, Davidson, Yakusho & Beck, 2004; Lun, Erdman & Reimer, 2009). Indeed, studies that assess the prevalence of disordered eating or clinical eating disorders may significantly underestimate the prevalence of the triad as many athletes may inadvertently fail to increase their energy intake to compensate for the energy expended through exercise (Loucks, Kiens & Wright, 2011).

There have been a number of attempts to estimate the prevalence of the female athlete triad amongst female athletes of varying abilities and ages (Beals & Manore, 2002; Nichols, Rauh, Lawson, Ji & Barkai, 2006; Pollock et al., 2010; Torstveit & Sundgot-Borgen, 2005b). However, prevalence estimates range from 1.2% to 16% for athletes displaying all three elements of the female athlete triad, due to a lack of consistency across studies with regards to the location on the spectrum that is used to distinguish athletes with and without the triad (DiPietro & Stachenfeld, 2006; Nattiv et al., 2007). Indeed, cross-sectional studies exploring the incidence of the female athlete triad lack validity due to the identified temporal relationship, where low energy availability is a precursor to both menstrual dysfunction and reduced bone mineral density (Nattiv et al., 2007). In addition, individual variations in oestrogen concentration and bone mineral density are not controlled for in cross sectional approaches to investigating the female athlete triad (DiPietro & Stachenfeld, 2006).

There are several other issues with the methodology of studies exploring the female athlete triad, such as including heterogeneous groups of athletes from a variety of sports and of differing competition levels; small sample sizes; and a lack of appropriate control group inclusion (DiPietro & Stachenfeld, 2006). There is also a significant lack of prospective studies in this area, making the true prevalence of the triad difficult to determine. Point-prevalence studies are limited given the long term rather than immediate impact of chronic energy depletion on bone health and menstrual function (Nattiv et al., 2007). Prospective studies that investigate the three factors over an extended period are necessary to assess the true prevalence rate of the female athlete triad. The broad nature of the definition of the female athlete triad spectrum suggests that athletes both with and without distorted body image concerns can be considered, and as such cannot provide a reliable indication of the proportion of athletes with disordered eating. Consuming sufficient energy for athletic activity is a significant problem among athletes (Hinton et al., 2004; Lun et al., 2009) and the female athlete triad draws attention to the potential long term consequences of sustained low energy intake. However, where the restriction of food intake is associated with a significantly
distorted body image and concern about weight gain among athletes, categorisation using anorexia nervosa criteria may be more appropriate and helpful from a therapeutic perspective.

1.3.8 Muscle Dysmorphia

The final subclinical condition that has been identified as a potential variant of eating psychopathology within the sporting context is that of muscle dysmorphia. The original term of ‘reverse anorexia’ was adopted by Pope and colleagues (1993) following research with male bodybuilders to describe their experiences of perceiving their body to be ‘too small and weak’ (despite their large and muscular appearance), which resulted in significant impairment to normal daily functioning (Pope, Gruber, Vhoi, Olivardia & Phillips, 1997). Indeed, previous research has indicated that muscle-dysmorphic individuals may be more likely to engage in steroid use or take other performance enhancing substances (Olivardia, 2001). However, there are substantial methodological issues with the current literature base in this area. For example, there is a lack of consensus with regards to the most appropriate measures to assess muscle dysmorphia and the terminology used to define and diagnose the condition (Suffolk, Dovey, Goodwin & Meyer, 2013). Similarly, much of the research has been conducted with bodybuilders, with limited research exploring the notion of muscle dysmorphia beyond this participant group (Suffolk et al., 2013).

There is still relatively limited knowledge as to the epidemiology, etiology and impact of muscle dysmorphia on psychosocial functioning (Murray, Reiger, Touyz & De la Garza Garcia, 2010; Suffolk et al., 2013). In particular, it must be noted that muscle dysmorphia appears as a subtype of body dysmorphic disorder within the DSM-5, rather than within the eating disorders (APA, 2013). The location of the disorder in the DSM has been a subject of much debate (Murray et al., 2010; Murray & Touyz, 2013; Suffolk et al., 2013). In recognition of the growing evidence for the condition, the DSM-5 does specify muscle dysmorphia as a distinct body dysmorphic disorder (APA, 2013). However, the similarities between muscle dysmorphia and AN has provided support for inclusion of muscle dysmorphia within the eating disorder spectrum, as opposed to the somatoform disorder spectrum (Murray et al., 2010). For example, Murray and colleagues (2010) suggested that the disorder centres around obsessive-compulsive features in relation to rigid training schedules and dietary manipulation, much like the behavioural rigidity and cognitive disturbances observed in AN. Similarly, these authors suggested that reconceptualising muscle dysmorphia within the eating disorder spectrum may offer greater clinical utility in recognising the ‘male experience’ of eating psychopathology, as currently a high proportion of men with eating disorders are classified as EDNOS (Murray et al., 2010). However, it is likely that this debate will continue until the next revision of the DSM and perhaps beyond. The transdiagnostic model of eating disorders will be introduced in the next section, in light of some of the difficulties discussed with the diagnostic criteria and classification systems.
1.3.9 Limitations of diagnostic criteria and the transdiagnostic approach

It is acknowledged that the systematic classification of eating disorders is essential for both researchers and clinicians alike, as it permits consistency in diagnosis and assessment, can assist in evaluation and comparison across the field, and can facilitate treatment decisions and subsequent outcome for the patients (NICE, 2004; Thomas et al., 2009). However, differences still exist between the two major classifications systems (DSM-5 & ICD-10; APA, 2013; WHO; 2010). Considerable revisions have been made to the DSM-5, however the classification of eating disorders is still a topic of considerable controversy and debate amongst academic researchers and clinicians alike (e.g., Fairweather-Schmidt & Wade, 2014; Jordan et al., 2014; Quick, Berg, Bucchianeri, Byrd-Bredbenner, 2014).

A crucial theoretical position that has dominated the field in the last decade is that of the transdiagnostic model of eating disorders (Fairburn, Cooper & Shafran, 2003). This theory proposes that there are common risk factors and mechanisms that underlie eating psychopathology, and proposes that individual differences occur in the manifestations of symptoms (such as restrictive or binge/purge features) as opposed to the underlying causes and maintenance factors (Fairburn et al., 2003). The transdiagnostic model identifies four key features that exist across the diagnostic categories, which Fairburn and colleagues propose underpin eating psychopathology. Factors of perfectionism, low self-esteem, mood-intolerance and interpersonal difficulties interact with the core eating psychopathology of an over valuation of eating, shape and weight, and thus contribute towards the development and maintenance of eating psychopathology (Fairburn et al., 2003). Considerable evidence supports the role of each of the four main factors within the model, in addition to evidence from clinical populations supporting the validity of a transdiagnostic model, as opposed to distinct diagnostic categories (Fairburn et al., 2007). For example, Milos and colleagues (2005) demonstrated that just one third of individuals with eating disorders retained their original diagnosis over the course of a 30 month period.

Core eating psychopathology.

Fairburn and colleagues (2003) proposed that the over-valuation of eating, shape and weight is of primary importance in maintaining eating psychopathology, and that many of the clinical features of eating disorders stem from this core psychopathology. Central to the eating disorders is a dysfunctional system for evaluating self-worth, which is based primarily around eating habits, shape and weight, and individual control over these factors (Fairburn et al., 2003). As a consequence, eating disordered individuals become preoccupied with their weight, eating and appearance, and behavioural and attitudinal features of the eating disorders can emerge, such as extreme dietary restraint, binging and purging behaviour to aid weight loss (Fairburn et al., 2003).
Clinical perfectionism.

Fairburn and colleagues (2003) suggested an interaction between perfectionism and the core eating psychopathology. Indeed, increased levels of perfectionism has been found to not only precede the development of an eating disorder (Bardone-Cone et al., 2007), but is also associated with increased levels of severity (Sutander-Pinnock, Woodside, Carter, Olmsted, & Kaplan, 2003) and poorer treatment outcomes and recovery (Forbush, Heatherton & Keel, 2007).

Self-esteem.

Low self-esteem is characterised by a pervasive negative view of oneself, which can obstruct eating behaviour change, and ultimately recovery (Fairburn et al., 2003). Low levels of self-esteem are commonplace among those with elevated eating psychopathology (Gilbert & Meyer, 2005), and across mental health issues more widely, such as depression (Courtney, Gamboz & Johnson, 2008).

Mood intolerance.

Mood intolerance within the transdiagnostic model refers to a difficulty in coping with adverse mood states, such as anger, depression or anxiety, which can trigger inappropriate methods of mood regulatory behaviour, such as binge eating, intense exercise behaviour and self-induced vomiting (Fairburn et al., 2003). Other forms of dysfunctional mood regulatory strategies include self-harm and substance abuse, which have been found to commonly occur among eating disorder patients (e.g. Claes, Vandereycken & Vertommen, 2001; Paul, Schroeter, Dahme & Nutzinger, 2002), and highlighting the challenges with emotion regulation in this group. Indeed, higher levels of difficulties with emotion regulation have been reported among clinical populations in comparison to healthy controls (e.g. Brockmeyer et al., 2014; Harrison, Sullivan, Tchanturia and Treasure, 2010).

Interpersonal difficulties.

The last factor outlined within the transdiagnostic model is that of interpersonal difficulties. Fairburn and colleagues (2003) noted several interpersonal components of eating disorders that led to the inclusion of this factor within the transdiagnostic model. For example: triggers of binge eating tended to be interpersonal in nature; clear links exist between interpersonal difficulties and self-esteem; interpersonal environments can heighten eating, shape and weight concerns; and poor interpersonal functioning can impact negatively on the efficacy of treatment (Agras et al., 2000).

The transdiagnostic model of eating disorders and the athletic population

Whilst classification criteria are still important within research and clinical environments, the transdiagnostic model offers a novel approach to eating psychopathology, by considering the
psychosocial factors that exist across the diagnostic categories (Fairburn et al., 2003). The approach offers clear avenues for prevention and intervention, regardless of patient background and diagnostic status. Importantly, there is evidence to suggest that the transdiagnostic model is relevant for eating psychopathology in the athletic population (Shanmugam, Jowett & Meyer, 2011), further reinforcing the value of the model beyond the clinical population, within which it was developed. Indeed, three of the core factors of the model were supported as contributing to increased levels of eating psychopathology in athletes (Shanmugam et al., 2011). In particular, interpersonal difficulties, low levels of self-esteem, high levels of self-critical perfectionism and depressive symptoms were predictive of eating psychopathology in athletes, regardless of sport type and level of competition (Shanmugam et al., 2011). Mood intolerance and specifically, dysfunctional mood regulatory strategies were not examined in this model, hence remains an area yet to be verified within the athletic population.

1.3.10 Summary: Classification of eating psychopathology

The previous section has outlined the current diagnostic criteria utilised by clinicians and researchers to identify and classify eating disorders, and a summary of some of the subclinical conditions deemed to be specific to the sporting context has been provided. Classification systems allow consistency of eating disorder diagnoses to occur across the field, and are useful for informing treatment and therapeutic decisions (NICE, 2004). However, individuals with eating disorders rarely maintain the same diagnosis across the course of their disorder, whilst those who do not meet clinical criteria may still experience significant suffering and impact on their quality of life, with limited access to support and treatment services. The following section reviews the prevalence of eating disorders among the general population and in the athletic population. It identifies athlete groups where eating disorder prevalence rates are particularly high, and outlines some of the difficulties with conducting epidemiological research in the area.

1.4 Prevalence of eating disorders

1.4.1 Prevalence of eating disorders in the general population.

The field has consistently identified an increased prevalence of eating disorders among adolescent females, with point prevalence estimates of 0.3% for AN and 1.0% for BN (Hoek, 2006). In comparison, the lifetime prevalence of AN among women of all ages is estimated at 0.9% (compared to 0.3% amongst men), and 1.5% for BN (0.5% for men respectively; Hudson, Hiripi, Harrison & Kessler, 2007). However, it is estimated that only 30% of those meeting diagnostic criteria for AN, and just 6% meeting the criteria for BN are treated in mental healthcare, with community and primary care being the main sources of treatment for the eating disorders (Hoek, 2006). Prevalence rates for eating disorders among the general population are difficult to
Introduction

accurately establish due to a distinct lack of large scale epidemiological studies (Hoek & van Hoek, 2003), and a resistance to treatment-seeking among sufferers, particularly among ethnic minority groups (Cachelin & Striegel-Moore, 2006). It is likely therefore, that prevalence reports significantly underestimate the true prevalence of eating disorders in the population (Hudson et al., 2007). In addition, the majority of the prevalence data has emerged from European and American based researchers, with limited evidence available from outside of these regions (Jacobi et al., 2004; Preti et al., 2009).

1.4.2 Prevalence of subclinical conditions

The prevalence of disordered eating behaviours has been found to be at least twice as high as that of clinical eating disorders within the general population (e.g., Shisslak et al., 1995; Striegel-Moore, Silberstein, Frensch & Rodin, 1989). Indeed, Neumark-Stzainer and colleagues (2011) reported that nearly half of their sample of female adolescent girls reported dieting in the last year, compared to 25% of boys; whilst nearly 1 in 5 females reported engaging in extreme weight control behaviours, compared to just 1 in 20 boys of the same age. Even outside of the traditionally ‘high risk’ adolescent age group, nearly a third of older women (aged 25-45 years) have been found to report purging behaviours to control weight and shape, and nearly three quarters of women admit feeling dissatisfied with their weight and shape (Reba-Harrelson et al., 2009). Only a small proportion of those displaying disordered eating behaviours and attitudes will go on to develop full-blown clinical eating disorders (e.g., Fairburn et al., 2005). However, both the close association between symptoms of eating psychopathology and comorbid conditions such depression and anxiety (e.g., Jacobi et al., 2011; Touchette et al., 2011), and the impact of disordered eating on quality of life (e.g., Herpertz-Dahlmann et al., 2008; Leung et al., 2013) and physical health and nutritional status (Nattiv et al., 2007), highlights the importance of conducting research across the eating psychopathology spectrum, and not just with those who have diagnosed clinical conditions.

1.4.3 Prevalence of eating disorders and disordered eating in athletes

A considerable proportion of the literature into eating disorders in sport has attempted to establish first, whether an increased prevalence of eating psychopathology exists among athletes, and second, to identify the groups of athletes where the highest levels of eating psychopathology exist. Identifying vulnerable groups is an important part of research to ensure that prevention and intervention efforts are appropriately targeted (Striegel-Moore & Bulik, 2007).

Prevalence estimates of eating disorders in athletes vary considerably. This is likely to be due to wide variation in the methodological approaches and the participant groups investigated. In particular, differences in sample size, sport group, age group, level of competition and utilising
self-report questionnaires or clinical interviews may be responsible for the wide variety in prevalence rates reported in the field. Table 1.5 provides data from studies that have used a clinical interview to determine eating disorders amongst athletes; an approach which is suggested to be more accurate than self-report instruments in estimating the presence of clinical eating problems (Bratland-Sanda & Sundgot-Borgen, 2013).

Disordered eating behaviours and subclinical eating disorders are also common among athletes, with estimates of between 20-45% of female athletes reporting disordered eating symptoms and pathological methods of weight control (Anderson & Petrie, 2012; Greenleaf, Petrie, Reel & Carter, 2008; Martinsen, Bratland-Sanda, Erikkson & Sundgot-Borgen, 2010; Nichols, Rauh, Barrack, Barkai, & Pernick, 2007; Torstveit, Rosenvinge & Sundgot-Borgen, 2008). There is also some evidence to suggest that male athletes demonstrate higher levels of disordered eating in comparison to their non-athletic counterparts (e.g. Petrie, Greenleaf, Reel & Carter, 2008; Riebl, Subduhi, Broker, Schenck & Berning, 2007). Overall, however, there are few studies investigating the prevalence of disordered eating in athletes that have included a comparison control group. Where a control has been included, the findings vary considerably, and wide variations in prevalence estimates are reported. There is also a distinct lack of consensus across the literature as to whether athletes are at a greater or a reduced risk of disordered eating in comparison to their non-athletic counterparts (e.g., Martinsen et al., 2010; Rosendahl, Bormann, Aschenbrenner, Aschenbrenner, & Strauss, 2009, Torstveit et al., 2008).

**Interview prevalence studies**

Table 1.5 indicates that the prevalence of clinical eating disorders across a variety of athlete groups ranges from just 1% up to 46%. The results suggest that there may indeed be an increased vulnerability for eating disorders among the athletic population in comparison to non-athletes, and that similar to the gender differences observed within the general population, female athletes are at an increased risk of eating disorders in comparison to male athletes (e.g. Byrne & McLean, 2002; Martinsen & Sundgot-Borgen, 2013; Schaal et al., 2011; Sundgot-Borgen, 1993; Sundgot-Borgen & Torstveit, 2004).
### Table 1.5 Prevalence of eating disorders and disordered eating amongst athlete groups, as determined by studies using a clinical interview

<table>
<thead>
<tr>
<th>Study</th>
<th>Population (n)</th>
<th>Age (yrs)</th>
<th>Initial screening</th>
<th>Interview &amp; clinical criteria</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachner-Melman et al. (2006)</td>
<td>Non elite aesthetic athletes (n = 111); non-lean athletes (n = 68); controls (n = 248) and AN patients (n = 31)</td>
<td>13-35</td>
<td>Participants were invited to a clinical interview if they:</td>
<td>Structured clinical interview used to establish presence or absence of an eating disorder using DSM-IV criteria.</td>
<td>Lifetime eating disorder: Aesthetic athletes: 17.1% (4.5% AN, 1.8% Bn &amp; 11.7% EDNOS). Non aesthetic athletes: 8.6% (1.4% AN, 1.4% BN &amp; 5.8% EDNOS). Controls: 10.4% (3.2% AN, 2.8% BN, 4.4% EDNOS).</td>
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<tr>
<td>Black et al., (2003)</td>
<td>NCAA Division 1 athletes (n=92); club athletes (n=15) &amp; dancers (n=41)</td>
<td>18-25</td>
<td>EDI, Drive for Thinness (DT) ≥14; Body Dissatisfaction (BD) ≥20 Bulimia Test Revised ≥104. All participants took part in the first and second phase of the study.</td>
<td>Eating Disorders Examination (DSM-IV criteria). Disordered eating criteria: - BMI 18-19.9 kg/m² - purging/bingeing ≥1/wk for 3mo; - body fat 14-17%; - fear of weight gain &amp; feeling fat.</td>
<td>Current eating disorder: 18% of participants were diagnosed with a clinical eating disorder (1% AN, 13% BN, 4% EDNOS). 34% were classified as disordered eating.</td>
</tr>
<tr>
<td>Byrne &amp; McLean (2002)</td>
<td>Elite athletes from variety of sports. Male (n = 108) and female (n = 155) &amp; matched controls (n = 263).</td>
<td>15-36</td>
<td>EDI-2: Drive for Thinness, Bulimia and Body Dissatisfaction subscales, Bulimia Test Revised, Restraint subscale of Three Factor Eating Questionnaire (collected for comparative purposes)</td>
<td>All athletes were interviewed using the Composite International Diagnostic Interview, using DSM-IV criteria for eating disorders.</td>
<td>Current eating disorder: Females: 31% lean (5% AN, 10% BN, 16% EDNOS); 8.5% non-lean (2% BN, 6.5% EDNOS); 5.5% controls (1% BN, 4.5% EDNOS) Males: 8% lean (4% AN, 2% BN, 2% EDNOS) No ED for non-lean or controls.</td>
</tr>
<tr>
<td>Study</td>
<td>Population</td>
<td>Ages (yr)</td>
<td>Methodology</td>
<td>Results</td>
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<td>Herbrich et al. (2011)</td>
<td>Elite female ballet dancers (n = 52); adolescents with AN (n = 52) and non-athletic controls (n = 44)</td>
<td>13-20</td>
<td>All 11 subscales of the EDI-2 were completed for comparison. All participants took part in the interview phase.</td>
<td>Composite international diagnostic interview and structured clinical interview for axis I (ICD-10 criteria for ED; prevalence of anorexia athletica (AA) evaluated).</td>
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<tr>
<td>Martinsen &amp; Sundgot-Borgen. (2013)</td>
<td>Adolescent elite athletes (n = 611) and controls (n = 355)</td>
<td>15-16</td>
<td>EDI-2 and Hopkins Symptom Checklist (SCL-5). At risk participants were interviewed: DT ≥15 (f) ≥10 (m) BD≥14 (f) ≥ 10 (m) BMI ≤18; dieting, compensatory behaviours; menstrual dysfunction</td>
<td>Current eating disorder: Athletes: 1.9% AN; 5.8% AA; 73.1% disordered eating. AN patients: 21% AA Controls: 2.3% AA</td>
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<tr>
<td>Schaal et al. (2011)</td>
<td>Elite junior &amp; adult male and female athletes (n = 2067)</td>
<td>12-35</td>
<td>No initial screening phase was conducted.</td>
<td>Current eating disorder: Males: 4% (3.6% EDNOS) Females: 6.5% (5.9% EDNOS) Lifetime eating disorder: Males: 5.5% (0.5% AN, 0.7% BN, 4.8% EDNOS); Females: 11.2% (2.1% AN, 2.6% BN, 9% EDNOS)</td>
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<tr>
<td>Sundgot-Borgen (1993)</td>
<td>Adolescent and adult female elite athletes (n = 133) and controls (n = 60)</td>
<td>12-35</td>
<td>All participants took part in the structured clinical interview.</td>
<td>Current eating disorder: Athletes: 17.5% ED (1.3% AN, 8.0% BN, 8.2% AA) Controls: 5.1% ED (1.3% AN; 8.3% BN)</td>
<td></td>
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<tr>
<td>Sundgot-Borgen (1996)</td>
<td>12 female elite gymnasts &amp; 12 age-matched controls</td>
<td>13-20</td>
<td>No initial screening phase due to small sample.</td>
<td>Current eating disorder: Gymnasts: 16.7% ED; 16.7% AA None of the controls had a clinical/subclinical ED.</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Population Description</td>
<td>Age Range</td>
<td>Screening Method</td>
<td>Controls</td>
<td>Eating Disorder Prevalence</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Sundgot-Borgen &amp; Torstveit, 2004</td>
<td>Elite population of Norwegian male and female athletes (n=1620) and controls (n=1696)</td>
<td>15-39</td>
<td>Screening phase using the EDI to classify athletes as at risk. EDI scores ≥ 40.</td>
<td></td>
<td>Current eating disorder:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>All athletes and controls classified as at risk for EDs and a sample of healthy</td>
<td></td>
<td>Male athletes: 8% ED;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>participants were invited to participate in the Eating Disorder Examination</td>
<td></td>
<td>(anti-gravitation 22%;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Questionnaire using DSM-IV criteria.</td>
<td></td>
<td>ball games 5%; endurance 9%).</td>
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<td></td>
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<td></td>
<td>Current eating disorder:</td>
<td></td>
<td>Females athletes: 20% ED (aesthetic 42%;</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>endurance 24%; technical 17%; ball games 16%).</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Male controls: 0.5%ED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Female controls: 9% ED</td>
</tr>
<tr>
<td>Sundgot-Borgen &amp; Torstveit, 2007</td>
<td>17 elite female football players</td>
<td>Mean 19.9</td>
<td>EDI was used to initially screen athletes in line with previous studies</td>
<td></td>
<td>Current eating disorder:</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(Sundgot-Borgen &amp; Torstveit, 2004).</td>
<td></td>
<td>Athletes: 24% ED</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Controls: 21.1% ED</td>
</tr>
<tr>
<td>Torstveit, Rosenvinge, &amp; Sundgot-Borgen 2008</td>
<td>A total of 930 female elite athletes &amp; 900 age-matched controls screened.</td>
<td>13-39</td>
<td>Selection for interview stratified according to at risk criteria:</td>
<td></td>
<td>Current eating disorder:</td>
</tr>
<tr>
<td></td>
<td>186 (145 controls) interviewed</td>
<td></td>
<td>EDI DT ≥ 15; BD ≥ 14; BMI &lt; 18.5 kg/m²; Pathogenic weight control</td>
<td></td>
<td>Athletes: 33% ED (4.8% AN, 8.1% BN, 19.9% EDNOS)</td>
</tr>
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<td></td>
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<td></td>
<td>Lean: 46.7% ED (8.9% AN, 11.1% BN, 26.7% EDNOS)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-Lean: 19.8% ED (1.1% AN, 5.2% BN, 13.5% EDNOS)</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Controls: 21.4% ED (4.2% BN, 17.2% EDNOS)</td>
</tr>
</tbody>
</table>
On evaluating the studies, it appears that there are a number of factors that can explain the wide variation in the prevalence estimates. First, that there is considerable variation in the samples investigated. For example, some of the studies have focused on just one sport such as football (e.g. Sundgot-Borgen & Torstveit, 2007), gymnastics (e.g., Sundgot-Borgen, 1996), or dance (Herbrich et al., 2011), whilst others have considered athletes from a wide variety of sports, preferring to group them according to the type of sporting activity (e.g. Byrne & McLean, 2002; Sundgot-Borgen & Torstveit, 2004; Torstveit & Sundgot-Borgen, 2008). The most commonly used method of grouping athletes when investigating prevalence rates across athletes from different sports is to differentiate between ‘lean’ and ‘non-lean’ sports. Lean sports are defined as those that place a competitive or aesthetic value on leanness, such as endurance events, aesthetic sports such as gymnastics and dance, anti-gravitation sports such as high jump, and weight dependent sports such as lightweight rowing (Otis, Drinkwater, Johnson, Loucks & Wilmore, 1997; Smolak, Murnen & Ruble, 2000). On the contrary, non-lean sports are those where leanness is not necessarily considered advantageous for performance. Examples include ball sports such as football and hockey, technical sports such as golf and power sports such as shot putt and javelin throw (Sundgot-Borgen & Larsen, 1993b). This method of classifying athletes according to sport type has been used consistently within the field when investigating heterogeneous athlete groups (e.g., Byrne & McLean, 2002; Sundgot-Borgen & Torstveit, 2004; Torstveit & Sundgot-Borgen, 2005). As a consequence, some studies have managed to include very large, but somewhat heterogeneous samples of athletes from a variety of sports (e.g., Martinsen & Sundgot-Borgen, 2013; Schaal et al., 2011; Sundgot-Borgen & Torstveit, 2004), whilst studies with more homogeneous groups tend to have substantially smaller samples (e.g. Sundgot-Borgen, 1993; 1996; Sundgot-Borgen & Torstveit, 2007), from which it is difficult to infer population prevalence rates of eating disorders.

In addition, the vast majority of the studies reported in Table 1.5 have explored athletes competing at an elite level within their sport; just two studies had reported including athletes at lower levels of competition (Bachner-Melman et al., 2006; Black et al., 2003). However, the studies did not always define ‘elite’ in the same way, which makes comparison across the studies difficult. For example, ‘elite’ in the study by Sundgot-Borgen & Torstveit (2004), was either defined as an athlete who was ranked in the top 10 in the world, was competing for the national team, and/or was member of a recruiting squad for those teams. However, the criteria used by Schaal and colleagues were less clear. The authors specified that the athletes included in the study were registered on the French High Level or Junior athlete lists. “High Level” athletes had been selected by their sport's national federation for attaining specific performance criteria; however this criteria was not provided. Similarly, “junior” athletes were those who had been recognized as delivering ‘strong’ performances in their age category. Research regarding level of competition as a potential factor in the development of eating disorders in athletes has been mixed (Smolak et al.,
2000; Picard, 1999); however comparison across studies is difficult due to the differences in definitions used.

There are other potential methodological issues that can be noted from the studies reported in Table 1.5. For example, the age range included is often quite substantial, with both adolescent and adult athletes included and only a minority of the studies controlling for age in prevalence estimates (e.g. Byrne & McLean, 2002; Schaal et al., 2011; Sundgot-Borgen & Torstveit, 2004; Torstveit et al., 2008). This is despite the consistent findings within the literature with respect to the increased risk of eating disorders in adolescence (e.g. Hoek & van Hoeken, 2003). In addition, some studies report lifetime incidence of eating disorders, whilst others report current eating disorders in the sample (e.g. Schaal et al., 2011; Sundgot-Borgen & Torstveit, 2004). Longitudinal studies exploring the incidence of eating disorders in athletes over time are still rare within the field (e.g. Krentz & Warschburger, 2013; Shanmugam, Jowett & Meyer, 2014) and yet would be arguably more useful for both researchers and clinicians in identifying athlete groups where the risk for eating disorders is consistently elevated.

Despite the limitations outlined, the studies that have used a clinical interview to determine the prevalence of eating psychopathology in athletes are considered to have adopted the strongest methodological approach (Bratland-Sanda & Sundgot-Borgen, 2013; Byrne & McLean, 2002). However, there are relatively few studies that have used this approach, in comparison to those employing self-report questionnaires to determine the presence and severity of eating psychopathology in athletes (Bratland-Sanda & Sundgot-Borgen, 2013; Papathomas & Lavallee, 2012). Self-report measures that are commonly used include the Eating Disorders Inventory, (EDI; Garner, 1991) Eating Attitudes Test (EAT; Garner & Garfinkel, 1979) or the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008).

Self-report studies

Many of the same methodological issues that have been identified for studies using clinical interviews are also relevant to self-report studies, particularly with regards to the sample sizes used, and the homogeneity of the samples investigated. The findings reported by studies using self-report measures are widely varied (Byrne & McLean, 2001). Indeed, some studies have found no significant differences in eating psychopathology between athletes and non-athletes (Johnson, Powers & Dick, 1999; Reinking & Alexander, 2005; Sundgot-Borgen, 1993). In contrast, other studies have indicated significantly higher levels of eating psychopathology among athletes (Holm-Denoma, Scaringi, Gorden, Van Orden & Joiner, 2009; Resch & Haasz, 2009; Sundgot-Borgen & Klungland, 1998; Toro et al., 2005), or have even reported a protective effect for athletes over non-athletes (Hausenblas & McNally, 2004; Martinsen, Bratland-Sanda, Eriksson & Sundgot-Borgen, 2010; Wilkins, Boland & Albinso, 1991). Indeed, two meta-analysis studies conducted ten years apart (Coelho, Soares & Ribeiro, 2010; Smolak, Murnen & Ruble, 2000) both concluded that, due
to the heterogeneity of studies and lack of longitudinal evidence, definitive conclusions regarding the prevalence of eating disorders in athletes cannot yet be drawn. The studies tentatively suggest a small overall increased risk for athletes over non-athletes for eating disorders and disordered eating, although sports participation can be protective in some scenarios; particularly among participants in non-elite, non-lean sports.

There is a considerable lack of consistency across studies for the definitions, measures and cut-offs used to detect athletes with disordered eating. For example, the Drive for Thinness Scale on the EDI is often used, but criteria for determining disordered eating ranges from scores 10 or more (Johnson et al., 1999; Martinsen et al., 2010) to cut-offs of 15 on the same scale (Marshall & Harber, 1996; Monsma & Malina, 2004), making comparisons between studies extremely difficult. Similarly, cut-offs on the Body Dissatisfaction scale range from 10 to 17 (Marshall & Harber, 1996; Monsma & Malina, 2004).

Other methodological issues within the prevalence literature include the large number of studies lacking an appropriate control group for comparison with athletes (Beals & Manore, 2002; Hulley & Hill, 2001; Johnson et al., 1999; Karlson, Becker & Merkur, 2001). Research exploring the role of competitive level is inconclusive and it is likely that outcomes from individual studies are heavily influenced by the homogeneity of the sample investigated. In contrast, sport-type has been consistently identified as an important factor to consider when estimating the prevalence of eating disorders amongst athletes, with athletes competing in lean sports reporting significantly increased levels of eating psychopathology in comparison to those competing in non-lean sports (e.g., Petrie, 1996; Sundgot-Borgen & Torstveit, 2004; Torstveit et al., 2008). Specifically, the evidence suggests that participants in lean sports (where a thin body size and shape is emphasised) may be at an increased risk for AN (Sundgot-Borgen & Torstveit 2004; Thompson & Sherman, 2010). It has been suggested that participation in such sports could potentially precipitate anorexic symptoms; equally individuals who are predisposed to develop anorexia nervosa could be drawn to engaging in such sports (Thompson & Sherman, 2010). In contrast, it has been suggested that bulimic symptoms are more common amongst athletes in weight category sports, where quick weight loss techniques are often employed and endorsed in the run up to competition to gain a competitive advantage (Hall & Lane, 2001). There is a small body of evidence to suggest that competitors in weight-class sports are at an increased risk of disordered eating behaviours, particularly binging and purging (Sundgot-Borgen & Torstveit, 2004; Theil, Gottfried & Hesse, 1993).

1.4.4 Summary: Prevalence of eating psychopathology in athletes

A large body of literature has explored the prevalence of eating psychopathology across a wide variety of athlete groups; however the field is still some way from conclusively determining which athletes are particularly vulnerable to the development of eating psychopathology. It is
difficult to draw conclusions from, or make comparisons across point-prevalence studies conducted with heterogeneous athlete groups. Moving forward, the focus should be on conducting high quality longitudinal research, which assesses a wide range of risk factors that could contribute towards the onset of eating psychopathology in athletes, and which could inform the development of future treatment and intervention programmes. In addition, the focus on quantifying eating disorders among athletes has somewhat drawn attention away from the individual athlete’s experience of eating psychopathology, which is equally, if not more important in understanding how best to intervene and tackle eating psychopathology within the sporting context (Papathomas & Lavallee, 2012).

In addition to identifying the prevalence of eating disorders across various groups, research has also focused on establishing correlates and causes of eating disorders, to inform the development of prevention and intervention programmes (Striegel-Moore & Bulik, 2007). The next section reviews generic risk factors for eating disorders, focusing on the role of exercise in the development and maintenance of eating psychopathology. A review of the sports specific risk factors that may contribute towards the increased risk for eating psychopathology among the athletic population is also presented.

1.5 Generic risk factors for eating disorders

The transdiagnostic model of eating disorders proposed four cognitive-behavioural characteristics, including mood intolerance, perfectionism, interpersonal functioning and self-esteem (Fairburn et al., 2003). The field has acknowledged that there are additional factors beyond these four that can contribute towards the development of eating psychopathology (Jacobi, Hayward, de Zwann, Kraemer & Agras, 2004; Striegel-Moore & Bulik, 2007). Indeed, risk factor research in the eating disorders has identified more than 30 factors that may contribute towards the development and maintenance of eating psychopathology (Jacobi et al., 2004). Going beyond the factors of adolescence, low body mass and female gender (Jacobi et al., 2004; Mitchison & Hay, 2014; Stice, 2002; Striegel-Moore & Bulik, 2007), research has also revealed social, familial, genetic, developmental, psychological and cultural factors that can contribute to the development of eating psychopathology.

Research exploring the biological risk factors for eating disorders has primarily focused on genetic predispositions, which, in combination with specific environmental triggers, can result in the development of eating psychopathology (Jacobi et al., 2004). Twin studies have supported a familial link for anorexia nervosa, bulimia nervosa and binge eating disorders, and suggest that genetic factors can account for up to 60% of eating disorder liability (Bulik, Sullivan, Wade & Kendler, 2000; Trace, Baker, Penas-Lledo & Bulik, 2013). The field is starting to move away from
attempting to identify single ‘eating disorder’ genes, to reviewing polygenic associations and conducting genome wide exploration (van Elburg & Treasure, 2013).

In addition, a wide variety of sociocultural factors have been implicated in the development and maintenance of eating disorders. Sociocultural models of eating disorders suggest that social pressure to be thin fosters an internalisation of the thin ideal and promotes subsequent body dissatisfaction (Stice, 2002). This body dissatisfaction can result in negative affect and dieting, which have been identified as important precursors to the development of eating psychopathology (Hilbert et al., 2014; Jacobi et al., 2004; Stice et al., 2002). In particular, the perceived pressure to be thin has been found to predict the onset of binge eating and also the maintenance of bulimic symptoms (Stice & Agras, 1998; Stice, Presnell & Spangler, 2002). Feedback and commentary about an individual’s physical appearance is another important sociocultural influence, and has primarily focused on the impact of negative or critical comments. Research in this area has indicated that negative comments about eating, weight and shape from peers, family and role models such as teachers, are associated with, and predictive of, eating disorder onset (Bailey & Riccardelli, 2010; Barr-Taylor et al., 2006; Goncalves, Machado, Martins & Machado, 2014; Jacobi et al., 2011, Pike et al., 2006). Finally, experiences of trauma, such as being a victim of physical, psychological or sexual abuse has also been associated with an increased risk of eating disorders (Mitchison & Hay, 2014; Stice, 2002). Other stressful or disruptive events such as moving house, a change in the family structure, bereavement and increased perceived pressures have also been found to correlate with eating psychopathology (Mitchison & Hay, 2014).

Dysfunctional family processes have also been identified as potential triggers for, and maintaining factors of eating disorders, particularly among adolescents (e.g., Le Grange, Lock, Loeb & Nicholls, 2010). Family functioning characteristics such as family discord, parental indifference or overprotectiveness, change in family structure, high parental expectations and high levels of criticism within the family have been identified as factors occurring prior to the onset of eating disorders (Hilbert et al., 2014; Kluck, 2010; Horesh et al., 1996; Shoebridge & Gowers, 2000). However, it has been suggested that these factors may engender an increased risk to general psychopathology rather than eating disorders in particular (Klump, Bulik, Kaye, Treasure & Tyson, 2009). Instead, eating disorders are likely to be a result of an interaction between inherent vulnerabilities and subsequent environment triggers (Klump et al., 2009). Familial involvement in therapy can improve patient outcomes, particularly among younger patients with acute anorexia nervosa (Couturier, Kimber & Szatmari, 2013). Finally, an important risk factor for eating psychopathology that has received growing attention within research over the last decade is the role of exercise, which is of particular relevance to this thesis.
1.6 Exercise and the eating disorders

Exercise has been identified as a key feature of the eating disorders, with implications for the outcome and efficacy of treatment (Dalle Grave, Calugi & Marchesini, 2008). The literature regarding the role of exercise in the aetiology of eating disorders will be evaluated in the following section, and a model of compulsive exercise will be presented. Links will be drawn with the emotion regulation literature to explore how compulsive exercise may be relevant to eating psychopathology in athletes.

1.6.1 The role of exercise in the eating disorders: development and maintenance

Exercise in the context of the eating disorders has received considerable attention amongst researchers in the last two decades (e.g., Dalle Grave et al., 2008; Davis et al., 1994; Meyer Taranis, Goodwin & Haycraft, 2011; Mond, Myers, Crosby, Hay & Mitchell, 2008; Shroff et al, 2006), in recognition of a potential role in the development and maintenance of eating psychopathology (Davis, Katzman & Kirsh 1999; Epling & Pierce 1996; Wichstrom, 1995). Exercise in the eating disorders has been traditionally conceptualised as a method of calorie wasting and weight control (Davis et al., 1994), however, there is growing evidence to suggest that the function of exercise is much more complex than this (Meyer et al., 2011).

With regards to a potential causal role of exercise within the eating disorders, there is evidence to suggest exercise behaviours change prior to the onset of an eating problem. For example, many patients report being involved in regular sport prior to starting to diet (Davis et al., 1997), and physical activity levels commonly increase prior to the onset of disorder (Davis, Kennedy, Ralevski & Dionne 1994). Indeed, increases in exercise have also been cited as the first symptom of eating disorders (Davis et al., 1994). Levels of physical activity also increase considerably during the acute phase of eating disorders, despite reduced energy availability (Davis et al., 1994), implicating exercise as a potential maintenance factor of eating disorders.

The increased attention towards exercise among researchers is perhaps partly due to the salience of exercise as a feature amongst eating disorder patients, right across the diagnostic categories (Shroff et al., 2006). Exercise has been most strongly associated with AN, with up to 55% of anorexic patients exhibiting high levels of exercise as a prominent characteristic of their disorder (Shroff et al., 2006). It has been suggested that exercising patients may suffer from a more severe form of eating disorder, as excessive exercise is associated with an increased length of hospitalisation (Solenberger, 2001) and higher rates of relapse (Carter, Blackmore, Sutandar-Pinnock & Woodside, 2004). Excessive exercise is also often the last symptom of eating disorders to subside (Kron, Katz, Gorzynski & Weiner, 1978).
1.6.2 A model of compulsive exercise

A lack of a universal definition and consistency in the terms used to describe exercise in the eating disorders has made drawing definitive conclusions about how it contributes to eating psychopathology extremely difficult (Meyer & Taranis, 2011). Exercise within the eating disorders was previously conceptualised in terms of weight control (Davis et al., 1994; Fairburn et al., 2003), and thus frequency and duration of exercise have been commonly assessed to determine what constitutes ‘excessive’ amounts of exercise. However, the frequency and duration of exercise has not been found to be predictive of, or related to eating psychopathology, suggesting limited support for the model of excessive exercise (Adkins & Keel, 2005; Lipsey, Barton, Hulley & Hill, 2006; Mond et al., 2006; Mond et al., 2008; Taranis, Touyz, & Meyer, 2011). Instead, the focus of research has moved towards exploring the underlying motivations for exercise, and in improving our understanding of the nature and experience of exercise within the context of the eating disorders (Taranis, Touyz & Meyer, 2011).

As such, a new multi-dimensional model of exercise within the eating disorders has been proposed, which takes into account the key underlying motivations for exercise that are believed to be closely related to eating psychopathology (Meyer et al., 2011). The model does not abandon the notion of exercising for weight control, but instead recognises additional cognitive-behavioural elements that may also serve to maintain eating psychopathology (Meyer et al., 2011). Additional components include compulsivity to exercise, including a rigid approach to exercise, and exercising despite illness or injury. It also encapsulates the positive, mood enhancing effects of exercise, as well as recognising a mood-regulatory component, in relation to the avoidance of negative affect, such as low mood or anxiety. The different elements of the model are supported by evidence from within the literature and elaborated on below. The proposed model of compulsive exercise is shown in Figure 1.4.

First, the mood regulatory function of exercise within the eating disorders has considerable support within the literature, both from clinical and non-clinical samples. For example, patients with eating disorders have reported exercising to avoid low mood as a more important reason for exercising over and above exercising for weight control, suggesting that exercise may be a maladaptive method of mood regulation (Bratland-Sanda et al., 2010a). Similarly, reductions in eating psychopathology among patients were associated with a reduced importance placed on the role of exercise for regulating negative affect (Bratland-Sanda et al., 2010b). Poor emotion regulation has been identified as a key feature in clinical and subclinical eating disorders, including a lack of emotional awareness and difficulties coping with negative emotions in a constructive manner (Harrison, Sullivan, Tchanturia & Treasure, 2010; Lavender & Anderson, 2010; Meyer, Leung, Barry & De Feo; 2010; Sim & Zeman, 2006). Importantly, the association between excessive exercise and emotion regulation difficulties has been consistently demonstrated within
recent research (Bewell-Weiss & Carter, 2010; De Young & Anderson, 2010; Goodwin, 2010; Peñas-Lledó, Vaz Leal, & Waller, 2002; Vandevelde et al., Probst & Vanderlinden, 2007). In relation to the present model, there is also evidence to suggest an association between compulsive exercise and emotion regulation among adolescent exercisers (Goodwin, Haycraft & Meyer, 2012). However, the mood-regulatory function of exercise has yet to be explored among athletes in relation to eating psychopathology.

Pathological attitudes towards exercise (particularly compulsivity or feelings of guilt) have been shown to play an important mediating role in the exercise-eating pathology relationship (Cook & Hausenblas, 2008), with increased levels of eating psychopathology evident among those who describe feelings of extreme guilt when exercise is missed (Mond, Hay, Rodgers & Owen, 2006; Mond et al., 2008). Compulsivity towards exercise has also been found to clearly distinguish between eating disordered and non-eating disordered exercisers (e.g., Adkins & Keel, 2005; Mond et al., 2006).

Given the salience of exercise within the eating disorders and its potential role in both the development and maintenance of eating psychopathology (Davis et al., 1997; Davis et al., 1994), it is perhaps unsurprising that eating disorders show an increased prevalence amongst athlete and exerciser groups (Byrne & McLean, 2002; Hulley, Currie, Njenga & Hill, 2007; Hulley & Hill, 2001; Lipsey et al, 2006; Sundgot-Borgen & Torstveit, 2004; Torstveit et al., 2008). However, the compulsive exercise model has yet to be explored with athletes, whose exercise behaviours, attitudes and motivations may be somewhat different to that of the general population. A definition of problematic exercise that focuses on the duration and frequency of exercise may bear little relevance for athletes; hence it is important to consider alternative proposals that can help to explain the increased prevalence of eating psychopathology among athlete groups. Identifying the maladaptive exercise attitudes and behaviours that are linked to increased levels of eating psychopathology among athlete groups may offer a useful method of identifying vulnerable athletes prior to the development of subclinical and clinical eating problems.

1.6.3 Summary: Risk factors for eating disorders in the general population

It is apparent that there are many risk factors that can contribute to the onset of eating disorders among the general population, including biological, psychosocial and environmental triggers. These general risk factors are also applicable to the athletic population, however, it has been suggested that elements of the sporting context can also contribute towards the development of eating disorders in this group (Thompson & Sherman, 2010). Athlete-specific risk factors for eating disorders are outlined in the following section.
Figure 1.4 Multidimensional model of compulsive exercise (Meyer et al., 2011)

- **Eating pathology**
  - Weight and shape concerns

- **Affect regulation**
  - *Psychological Dependence*
    - Positive Reinforcement
      - Mood Improvement
    - Negative Reinforcement
      - Avoidance of withdrawal

- **Compulsivity**
  - Guilt
  - Perceived negative consequences of stopping

- **Perfectionism**
  - High standards
  - Self criticism

- **Rigidity**
  - Inflexible attitudes
  - Rules

- **Compulsive Exercise**
1.7 Sports specific risk factors for eating disorders in athletes

It is has been widely acknowledged that the potential physical and psychological benefits of participating in sport considerably outweigh the potential risks (Haskell et al., 2007; Penedo & Dahn, 2005; Thompson & Sherman, 2010). Researchers have argued that participation in sport does not engender an increased risk to eating psychopathology but rather that the sporting environment exposes participants to additional risks that can trigger the development of eating disorders amongst those who are already vulnerable (Thompson & Sherman, 2010). A number of sport-specific sociocultural risk factors have thus been identified and associations with eating psychopathology among athletes explored.

1.7.1 Peer influences

The tendency of women to make comparisons with one another to determine their weight status has been well documented (Lin & Kulik, 2002; Striegel-Moore, McAvay, Rodin & Allen, 1986) and linked with increased levels of eating psychopathology (Gilbert & Meyer, 2003; Myers & Crowther, 2009). Social comparison is also common within the athletic population, particularly with regards to weight and performance. This process has been frequently referred to as ‘competitive thinness’, thus capturing the competitive nature of athletes even with regards to body image and appearance (De Bruin, Oudejans, Bakker & Woertman, 2009; Thompson & Sherman, 2010). It has been suggested that competitive thinness may be particularly prevalent in aesthetic sports where participants’ performance and appearance are judged (Thompson & Sherman, 2010). In addition, requirements to wear revealing sports attire may increase awareness, comparison and concern over body shape (Greenleaf, 2004; Reel & Gill, 1996; 2001; Toro et al., 2005).

Similarly, there is some evidence to suggest a contagion effect may exist within athlete groups for disordered eating behaviours. Crandall (1988) suggested that social pressures within groups arising from group social norms can lead group members to adapt their behaviours to ensure consistency with those norms. The normalisation of disordered eating behaviours by group members may therefore lead to an increased prevalence of such behaviours (Thompson & Sherman, 1993; 1999). For example, the restrictive eating behaviour of sports participants has been associated with their perception of their team members’ dieting behaviour (Engel et al., 2003). Indeed, athletes have identified their teammates and competitors as one of the main sources of pressure with regards to body image and weight (Filaire, Rouveix, Pannafieux & Ferrand, 2007).

1.7.2 Traumatic experiences

Traumatic and stressful experiences can trigger the onset of an eating disorder among the general population (Mitchison & Hay, 2014). Such experiences can also elicit eating disorders among athletes, although these are extended to include stressful experiences within the sporting
Introduction

context (Sundgot-Borgen, 1994). For example, experiences of emotional or physical abuse from a coach can trigger disordered eating behaviours (McMahon & Dinan-Thompson, 2011; Papathomas & Lavallee, 2012a; Stirling & Kerr, 2008). In addition, experiences that result in a change of routine or training ability can also trigger disordered eating behaviour, such as experiencing an injury (Sundgot-Borgen, 1994) or retiring from sport (Kerr, Berman & De Souza, 2006; Kerr & Dacyshyn, 2000; Lavallee & Robinson, 2007).

1.7.3 Personality factors

In addition to the personality characteristics that are associated with increased eating psychopathology among the general population, research has drawn parallels between the personality characteristics of a ‘good athlete’, with those personality traits observed in patients with anorexia nervosa (Thompson & Sherman, 1999). Six traits have been identified that may engender highly competitive athletes to disordered eating behaviours. These included high levels of mental toughness and self-control; a high commitment to training and exercise regimes; perfectionism, overcompliance and willingness to obey; selflessness and continuing despite pain or discomfort (Forsberg & Lock, 2006; Thompson & Sherman, 1999). These shared characteristics between athletes and anorexic patients may complicate identification by potentially masking anorexic behaviours, but also these traits could be reinforced within the sports environment, and perhaps misperceived as part of a positive sport ethic as opposed to a more serious problem (Thompson & Sherman, 1999). In addition, if athletic performance remains unaffected (or indeed improves), there may be a presumption of good health by coaches, sports professionals and peers alike, making early identification of potential eating problems difficult (Thompson & Sherman, 2010). There is mounting evidence within the literature to support the association between the identified ‘good athlete’ traits and eating psychopathology in athletes (e.g., Goodwin, Arcelus, Geach & Meyer, 2014; Forberg & Lock, 2006; Shanmugam, Jowett & Meyer, 2012; 2013; Yates et al., 2001).

1.7.4 Coach attitudes and behaviours

A final area that has been investigated as a potential risk factor, but also as a protective factor, is that of the role of the coach. The focus on the coach is likely in part to be due to the unique nature of the coach-athlete relationship in comparison to parent-child or peer to peer relationships (Jowett & Cockerill, 2002). The coach athlete relationship has been defined as a situation in which “a coach’s and an athlete’s cognitions, feelings and behaviours are mutually and causally interrelated” (Jowett & Cockerill, 2002). The nature of the relationship is determined by the combined interrelating of coaches’ and athletes’ thoughts, feelings and behaviours (Jowett & Poczwardowski, 2007). The quality of the coach-athlete relationship has important implications for
performance and success (Jowett & Cockerill, 2003), and is shaped by the motives of both the coach and athlete (Jowett & Poczwardowski, 2007). Performance-centred rather than person-centred coaching has also been associated with an increased vulnerability to disordered eating behaviour (Biesecker & Martz, 1999; Ryan, 1995).

The coach-athlete relationship has been described as one of the most important and influential relationships experienced by a young athlete (Gervis & Dunn, 2004). Athletes spend a significant amount of time with their coaches, particularly as they become more competitive and more successful (Donnelly, 1997) and the influence of a coach often extends beyond that of their physical training, encompassing factors such as academics, social interests and also their diet (Tomlinson & Yorganci, 1997). Therefore it seems likely that coaches and the quality of the relationships with their athletes will have a high impact on athlete experiences of sport. In many cases, coach behaviour can have a highly positive impact on athletes in terms of their perception of their level of competence, their autonomy and their levels of motivation (Mageau & Vallerand, 2003). However, coaches have also been implicated in issues relating to abuse and in the development of eating disorders and disordered eating behaviours (Jones, Glintmeyer & McKenzie, 2005; Papathomas & Lavallee, 2012a; Ryan, 1995; Stirling & Kerr, 2009). In the context of eating disorders in sport, the literature has tended to focus on the negative role of coaches, as opposed to the positive impact that coaches can have in terms of identification and management of eating problems among their athletes (Selby & Reel, 2011). A brief summary of some of the ways in which coaches may contribute towards the development and maintenance of eating disorders in athletes is presented next.

1.7.5 Weight monitoring practices

One of the largest studies to explore weight monitoring practices employed by coaches was conducted with over six hundred coaches within US collegiate system (Heffner, Ogles, Old Marsden & Johnson, 2003). The findings suggested that a significant proportion monitored the eating patterns, weight or body fat levels of their athletes, and nearly a third of coaches had encouraged athletes to lose weight (Heffner et al., 2003). In addition, athletes often report being asked to lose weight by their coaches (Kerr et al., 2006; Rosen & Hough, 1988, Reel & Gill, 2001), which can subsequently trigger disordered eating behaviours (Sundgot-Borgen, 1994). However, there are difficulties faced when collecting data on weight monitoring practices and behaviours of coaches, with potential social desirability biases limiting reporting of these practices. For example, Kerr and colleagues (2006) investigated perspectives of current and retired gymnasts, parents, judges and coaches on disordered eating in gymnastics. They found that very few coaches admitted to using weight monitoring and management strategies with their athletes. For example, none of the coaches in the study admitted to weighing their athletes or advising gymnasts to lose weight. However, these coaches also perceived these behaviours to be very common within the sport,
reporting that they believed that more than three quarters of gymnastics coaches measured body fat or monitored the weight of their athletes.

1.7.6 Attitude towards weight

The attitudes and beliefs of coaches towards weight may also represent a risk factor for the development of eating psychopathology among athletes. Coaches have been found to hold negative attitudes towards, and poor knowledge about, obesity, and report making decisions about the need for weight control on the basis of appearance as opposed to using objective measures (Griffin & Harris, 1996; Harris 2000). There is some evidence of differing athlete stereotypes and ideal performance attributes according to gender, as female athletes are more likely to be seen as needing to lose weight and male athletes as needing to gain weight (Griffin & Harris, 1996). Coaches also consistently hold the perspective that a lower body weight will result in better athletic performances (Harris, 2000; Rockwell, Nickols-Richardson, & Thye et al., 2001). It is likely that coach attitudes towards weight are conveyed to the athletes they coach; indeed the perceived strictness of a coach with regards to weight has been demonstrated to significantly predict Drive for Thinness scores on the Eating Disorders Inventory (Engel et al., 2003).

As previously identified, critical comments can trigger eating disorders among the general population (Bailey & Riccardelli, 2010; Jacobi et al., 2011, Pike et al., 2006) and athletes appear to be equally vulnerable. For example, athletes report negative comments from coaches as trigger factors for their dieting behaviour and critical in their eating disorder development (Arthur-Cameselle & Quatromoni, 2010; Chopak & Taylor-Nicholson, 1991; DeBruin, et al., 2009; Jones et al., 2005). Indeed, recall of, and the perceived intensity of such comments has been associated with higher levels of eating psychopathology (Muscat & Long, 2008; Kerr et al., 2006). However, retrospective studies in this area may be subject to poor recall and accuracy; longitudinal and prospective designs are likely to be more informative.

1.7.7 Summary: Risk factors for eating disorders in athletes

In summary, athletes face additional risk factors for eating disorders within the sporting context, which may contribute towards the increased prevalence of eating problems among this group. The focus of the academic literature with regards to eating disorders in sport has primarily been on establishing prevalence rates and potential causes of eating psychopathology. Comparatively, the treatment and management of eating disorders in athletes has been relatively neglected by researchers. The following section considers the current literature on the patient journey for eating disorders, starting with disclosure of an eating problem, therapeutic approaches, and the likely course and outcome of the eating disorders. In particular, it focuses on the ways in which disclosure can be promoted and facilitated, and the impact that this can have on the course
of eating disorders. It also outlines and evaluates the current therapeutic approaches for eating disorders. Lastly, literature exploring the course and outcome of eating disorders is presented.

1.8 Treatment and management of eating disorders

1.8.1 Eating disorder disclosure

Research indicates that the early detection of eating disorders is associated with a more favourable outcome (Deter & Herzog, 1994; Howard, Evans, Quintero-Howard, Bowers & Andersen, 1999; Zipfel et al., 2000), however many patients experience delays in accessing treatment (Cachelin, Rebeck, Viesel & Striegel-Moore, 2001; De la Rie, Noordenbos, Donker, & Van Furth 2006). Whilst there are many factors influencing patient access to treatment, acknowledging and disclosing that they are struggling with their eating can be considered to be the first step in this process (Gilbert et al., 2012). Primary disclosure of eating problems could be volunteered by the sufferer, or brought up by another individual. Recent findings from Gilbert and colleagues (2012) suggested that where disclosure was initiated by another individual, accessed help and specialist services faster than those who volunteered information about their eating problems. Other initiated disclosure experiences were not viewed any more negatively than when eating issues were volunteered.

Within the sporting context, coaches and sports professionals alike have expressed concerns over approaching an athlete who they suspect of having an eating problem (Nowicka, Eli, Ng, Apitzsch, Sundgot-Borgen, 2013; Vaughan, King & Cottrell, 2004). Indeed, research conducted with athletes has highlighted the difficulties they experience in disclosing eating issues (Papathomas & Lavallee, 2010). Recognising the importance of facilitating and encouraging disclosure among athletes may ensure faster access to treatment and an improved prognosis. It is important to identify the barriers to disclosing eating problems among athletes, to ensure that these can be minimised as far as possible. Such research could also help to inform and improve the confidence of coaches when approaching athletes with potential eating problems.

1.8.2 Treatment of eating disorders:

The literature presented above has suggested that many patients experience difficulties in revealing their eating disorder, and in subsequently seeking support and treatment. Indeed, there is evidence to suggest that even at the primary care level, general practitioners struggle to identify and diagnose eating disorders (Currin, Waller & Schmidt, 2009; Ogg, Millar, Pusztai & Thom, 1997; Whitehouse et al., 1992). However, once patients have been signposted into services, the vast majority receive treatment on an outpatient basis (NICE, 2004). Inpatient treatment is normally only available in the case of patients with AN who are considerably underweight and require a period of re-feeding for medical stability, but can be occasionally suitable for
normalisation of eating patterns among bulimic and binge eating patients (NICE, 2004). However, many services within the UK operate strict acceptance criteria for inpatient treatment, with patients requiring a BMI of 15kg/m^2 or below before they will be considered, and thus prioritising those patients with severe AN and who are medically unstable (B-eat, 2013). As a consequence, athletes may experience additional issues with accessing treatment, as they may be less likely to meet these weight criteria despite suffering from eating psychopathology. Whilst changes to the DSM criteria may help to reduce the focus on BMI criteria for treatment eligibility, long waiting lists and limited bed space are likely to lead to the continued use of such criteria to determine eligibility for inpatient treatment (B-eat, 2013).

Psychological therapeutic approaches are favoured for the treatment of eating disorders, and there are a wide range currently utilised, both within inpatient and outpatient settings. The most commonly utilised psychological therapy for the eating disorders is that of Cognitive Behavioural Therapy (CBT). CBT aims to challenge the maladaptive and disruptive thought processes of patients. CBT encourages patients to engage with more adaptive thoughts and to support patients in developing practical ways of coping on a day to day basis (Waller et al., 2007). Fairburn and colleagues (2009) have developed an ‘enhanced’ form of CBT (CBT-E) that tackles eating disorder features across the diagnostic spectrum, but also addresses other maintaining features as identified within the transdiagnostic model (Fairburn et al., 2003). For example, CBT-E also addresses mood intolerance, clinical perfectionism, low self-esteem and interpersonal difficulties. There is evidence from randomised controlled trials to suggest that this enhanced form of CBT is effective in treating patients with more complex eating disorders, i.e. that are maintained by a number of factors outside of the core psychopathology of eating, weight and shape concerns (Byrne, Fursland, Allen & Watson, 2011; Fairburn et al., 2009; Dalle-Grave, Calugi, Doll & Fairburn, 2013).

Another commonly employed treatment for AN is that of psychodynamic therapy. Psychodynamic therapy is a theory-based approach, which focuses on family dynamics and early experiences as contributors to eating psychopathology. Psychodynamic treatment encourages patients with AN to attend to their childhood experiences, and in particular unresolved conflicts, to explore how their eating disorder symptoms have arisen. Focal psychodynamic psychotherapy (FPT) was developed as a standardised form of time-limited psychodynamic psychotherapy (Dare & Crowther, 1995). A recent randomised controlled trial exploring the effectiveness of FPT versus CBT-E and treatment as usual among eating disorder services in Germany suggested that whilst CBT-E was most effective in terms of the speed of weight gain and improvements in eating psychopathology, FPT was identified as the most advantageous therapeutic approach at 12 month follow up (Zipfel et al., 2014).

Other forms of psychological therapy that are commonly utilised in treating eating disorders include Family Based Therapy (FBT) and Interpersonal Therapy (IPT). FBT is currently
the gold standard treatment for adolescents with AN (Lock & Le Grange, 2005; NICE, 2004), as it has been shown to be highly successful in treating even severely ill adolescents in comparison to other forms of therapy with this group (Couturier, Kimber, & Szatmari, 2013; Le Grange, 2005; Lock et al., 2010). FBT is the only treatment that has been demonstrated to be effective for a specific group of individuals, and has been deemed most effective when parents are actively involved in the treatment process (Le Grange, 2005).

In contrast, Interpersonal Therapy (IPT) is the leading evidence based therapy for eating disorders where binge eating is a feature (Murphy, Straebler, Basden, Cooper & Fairburn, 2012), and thus is commonly used with BN patients (e.g., Arcelus et al., 2009). IPT is a short term therapy which aims to help patients to identify and modify interpersonal problems, as opposed to directly addressing the eating disorder itself. IPT has been demonstrated as highly effective for bulimia nervosa, even over relatively short treatment intervention periods (Arcelus et al., 2009; Arcelus, Whight, Brewin & McGrain, 2012).

Psychological therapies are often combined with pharmacological treatment, due to the high co-morbidity of other psychiatric disorders with the eating disorders, such as depression and anxiety. Anti-depressants have been noted to reduce binges among BN and BED patients (Milano et al., 2013; Vocks et al., 2010), whilst low-dose anti-psychotics can be helpful in reducing anxiety and obsessive-compulsive behaviour among AN patients (Milano et al., 2013). Importantly, the effectiveness and experiences of eating disorder treatments within an athlete population have yet to be explored. The next section provides an overview of the course and outcome of eating disorders.

1.8.3 Outcome of eating disorders

The trajectory of the eating disorders is varied, with some patients experiencing acute but relatively short-lived symptoms, who may go on to make a full recovery, whilst others demonstrate a much more chronic pattern of symptoms, whereby full recovery is unlikely to be achieved (Fairburn & Harrison, 2003). A recent review from Keel & Brown (2010) indicated that the majority of AN patients who are treated as an outpatient achieve remission by 5-year follow up. In contrast, much lower rates of remission were observed for inpatients with AN. Similar findings were demonstrated by Berkman and colleagues (2007), who suggested that about half of those with AN were considered recovered after a period of five years. Slightly improved remission rates have been suggested for BN, with up to to two thirds of patients no longer meeting clinical criteria at follow up (Berkman et al., 2007).

Beyond the type of eating disorder (AN is associated with a significantly poorer outcome), additional factors that are associated with a poor outcome include psychiatric co-morbidity, excessive exercise, a long duration of illness prior to treatment seeking and poor interpersonal functioning (Carter, Blackmore, Sutandar-Pinock & Woodside, 2004; Keel & Brown, 2010, Zipfel, Lowe, Reas, Deter & Herzog, 2000). Mortality rates are particularly high among AN
patients, with up to 1 in 5 patient deaths attributable to the disorder (Arcelus et al., 2011; Crow et al., 1999; Osby, et al., 2000). There are no known studies that have explored the trajectory of eating disorders among an athletic population, with much of the research conducted cross-sectionally.

1.8.4 Summary: Treatment and management of eating disorders

Early intervention and treatment of eating disorders is a critical factor in determining a more positive outcome. In particular, encouraging early disclosure of potential eating problems can facilitate earlier treatment intervention. Treatment methods are primarily therapy based, with the treatment of choice largely dependent on the age of the patient and the nature of their disorder. The literature has yet to explore treatment experiences and success among athlete populations; however the coach has been identified as having an important role in identifying potential eating problems among athletes, and in signposting athletes to appropriate sources of support (Selby & Reel, 2011). The next section evaluates the current literature with regard to coach knowledge and methods of identifying and managing eating problems among their athletes.

1.9 Role of the coach in identifying and managing eating problems in athletes

1.9.1 Coach knowledge of eating problems

A considerable proportion of the research with coaches has focused on how much they know about eating disorders and disordered eating. These studies have indicated that most coaches could considerably improve their knowledge of eating disorders (Sherman, Thompson, Dehass & Wilfert, 2005; Turk, Prentice, Chappell & Shields, 1999) and basic nutrition (Rockwell et al., 2001; Zinn, Schofield & Wall, 2006). The largest study to have been conducted with coaches thus far was the National Collegiate Athletics Association of Coaches Survey (Sherman et al., 2005) involving nearly 3,000 US collegiate coaches from 23 different sports. Whilst this study didn’t directly test coach knowledge of signs and symptoms, it demonstrated that coaches did appreciate the seriousness of eating disorder symptoms both in terms of an athlete’s performance and their health. An exception was amenorrhea, with nearly half of coaches suggesting it was ‘normal’ or ‘not harmful’. Coaches have, however, expressed low levels of confidence in their own knowledge (Turk et al., 1999) whilst the majority of athletic trainers, who have a role similar to that of physiotherapists in the UK and thus work very closely with coaches, do not feel confident in identifying an athlete with an eating disorder (Vaughan, King, & Cottrell, 2004).

Whilst assessing knowledge is useful and indicates where educational intervention might be most appropriate, whether this knowledge is subsequently put into practice and used by coaches to help them to identify athletes at risk and manage them effectively is arguably the more crucial
aspect. Studies of coach knowledge of eating disorders have rarely linked current knowledge level
with previous educational experiences, which would indicate how effective these educational
attempts were. Research findings suggest that only a minority of coaches have attended educational
workshops or seminars on disordered eating (Turk et al., 1999; Sherman et al., 2005). Indeed, only
one study could be found that assessed coach knowledge and behaviour longitudinally after an
eating disorders educational intervention (Whisenhunt, Williamson, Drab-Hudson & Walden,
2008). The study indicated a small reduction in negative coaching behaviours (such as refraining
from using mandatory weigh-ins and avoiding negative comments about weight); however the
authors found no significant change in knowledge at follow up. One of the major drawbacks of the
study was a high drop-out rate at the eight-month follow up. In light of the risk factor research
previously presented, changes in coaching behaviour are potentially crucial in reducing eating
disorders in athletes.

One limitation of this body of research is that the majority has been conducted with
professional coaches for collegiate sports teams in the United States, which may not reflect the
knowledge of ‘amateur’ or voluntary coaches in other contexts; the majority of UK coaches are
volunteers (Sports Coach UK, 2011). In addition, there is no universal measure for assessing eating
disorder knowledge, which makes comparisons between studies difficult.

1.9.2 Coaches and the identification of eating disorders

The large NCAA survey (Sherman et al., 2005), indicated that coaches were aware of the
seriousness of eating disorder symptoms, and used a range of factors to help them to identify
athletes with potential eating issues, such as eating disorder symptoms, injury, depression, anxiety,
and a reduction in athletic performance (Sherman et al., 2005). Over three quarters of the coaches
involved in the study had previously identified an athlete with an eating disorder, with those
coaching in high risk sports reporting the highest number of identified athletes. The majority of
identified athletes were then referred onto a professional, usually a sports medic. In contrast,
Rockwell and colleagues (2001) reported that nearly a third of the coaches in their sample were
involved in treating the affected athlete.

Beals (2003) investigated the prevalence and perceived effectiveness of eating disorder
screening programmes within NCAA Division I institutions in the US. Nearly three quarters of
athletes and 60% of coaches had access to educational resources about eating disorders and
menstrual dysfunction; however this was rarely a formal requirement when it was offered.
However, only one in four physicians & athletic trainers perceived their screening programme to
be effective. In the NCAA survey (Sherman et al., 2005) over three quarters of coaches expressed
a desire for additional workshops and educational programmes on the subject. As a consequence,
the NCAA later circulated a Female Athlete Triad Manual to all US collegiate coaches (National
Collegiate Athletic Association, 2005). In addition, some UK sports governing bodies, such as
British Athletics have developed sports specific resources and support pathways, which have been reported as helpful in improving the confidence and awareness of eating disorders among coaches and sports professionals working within the organisation (Fylan, Currie & Lightfoot, 2014).

1.9.3 Qualitative research with coaches

Given the overall paucity of research conducted with coaches in this area, it might be expected that there would be an increased proportion of exploratory qualitative research. However, this is not the case; most of the studies employ quantitative methodological approaches when exploring coach beliefs and behaviours (e.g., Rockwell et al., 2001; Sherman et al., 2005; Turk et al., 1999). The focus has primarily been towards quantifying coach knowledge and in establishing the prevalence of weight monitoring practices. Some studies have incorporated qualitative aspects (e.g., Kerr et al., 2006) but just one recent study could be found that had explored the experiences of elite coaches in identifying and managing eating problems (Nowicka, Eli, Ng, Apitzsch, & Sundgot-Borgen, 2013). The Swedish coaches included in this study reported significant difficulties in identifying eating disorder symptoms among their athletes. In addition, they referred to several barriers in locating sources of support and were unsure as to how to manage an athlete with a potential eating issue (Nowicka et al., 2013). However, this research was conducted exclusively with elite coaches, and thus is unlikely to be reflective of the experiences of volunteer coaches, which make up the vast majority of the coaching workforce in the UK (Sports Coach UK, 2011). Questionnaire methods often impose a choice of responses on the participants, and may not sufficiently allow for the emergence of new ideas and themes. It is important to expand our knowledge of the challenges that coaches face with regards to identifying and managing athletes with eating disorders to ensure that educational programmes, resources and pathways of available support appropriately meet the needs of coaches and their athletes.

1.9.4 Summary: The role of the coach in identifying and managing eating problems in athletes

Coaches are in an ideal position with regards to identifying the signs and symptoms of eating disorders among athletes at an early stage (Selby & Reel, 2011), however there is limited research exploring whether coaches are able to exploit this position. Instead, research has focused on the knowledge of coaches with regards to eating disorder signs and symptoms, and as a consequence, there is a paucity of research with coaches that has sought to understand their experiences of identifying, managing and preventing eating disorders in athletes. In order to develop appropriate resources, workshops and support procedures for coaches and sports professionals, there is a need for researchers to explore the current challenges faced and the
mechanisms employed by coaches when identifying and dealing with athletes with potential eating problems.

The majority of the research presented thus far has explored eating disorders within the sporting context through adopting a cross-sectional, quantitative approach, focused on establishing risk factors and incidence rates. Whilst it is important to understand the epidemiology of, and risk factors for eating disorders in athlete groups, a number of researchers have warned against ignoring the experiential aspect of eating disorders and disordered eating among athletes (e.g., Papathomas & Lavallee, 2012). Instead, it is proposed that there is much to be learned from an in depth understanding of individual experiences of eating disorders within the sporting context, which may highlight additional research questions and factors that have yet to be explored quantitatively. As such, an evaluation of the current qualitative literature within the area of eating disorders in sport is presented in the following section.

1.10 Experiences of eating disorders in sport

There is a small body of qualitative research that has been conducted with athletes to explore their experiences of eating and body image within the sports context (Table 1.6). A small proportion of the literature has been conducted with athletes who have experiences of eating problems (e.g., Arthur-Cameselle & Quatromoni, 2014; De Bruin, Oudejans, Bakker, & Woertman, 2009; Jones, Glintmeyer & McKenzie, 2005) although requirements for a clinical diagnosis is rarely imposed (e.g., Papathomas & Lavallee, 2010, 2013; McMahon, Penney & Dinan-Thompson, 2012; Stirling & Kerr, 2011). Indeed, in many cases the focus is removed from the experiences of disordered eating and eating disorders per se, but rather explores how food and the body are experienced within the sporting context (e.g., Busanich, McGannon & Schinke, 2012; 2013; Coppola, Ward & Freysinger, 2014; Heaney, O’Connor, Naughton & Gifford, 2008; Krane, Waldron, Michalenok & Stiles-Shipley, 2001).

In line with the diverse nature of studies within this area, the methodologies employed are equally diverse, representing a range of qualitative methods from open ended questions on surveys (Arthur-Cameselle & Quatromoni, 2014; Kerr et al., 2006) to narrative analysis (Busanich et al., 2012; 2013) focus groups (Heaney et al., 2008; Krane et al., 2001) and discourse analysis (Cosh, Crabb, LeCouteur & Kettler, 2011). There were also examples of case studies of individual athlete experiences (Jones et al., 2005; Papathomas & Lavallee, 2006; 2012; 2013).
Table 1.6 Qualitative research exploring eating disorders & disordered eating among athletes

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Age (yrs)</th>
<th>ED status</th>
<th>Methodology</th>
<th>Main findings</th>
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<tbody>
<tr>
<td>Arthur-Cameselle &amp; Quatromoni (2014)</td>
<td>47 female current or former collegiate athletes from 14 different sports.</td>
<td>18-28 ( m=19.97 )</td>
<td>Self-reported diagnoses AN: ( n = 16 ) BN: ( n = 7 ); EDNOS: ( n = 20 ); BED: ( n = 4 ). Excluded if DSM-IV criteria not met.</td>
<td>Online questionnaire to assess ED symptoms, treatment utilised and open ended questions regarding recovery. Thematic analysis.</td>
<td>Factors influencing recovery: -Internal factors – desire to participate in sport, fed up of disorder, new coping mechanisms and avoiding triggers. -Important others – Support from others, treatment seeking, confrontation and intervention. -Environmental factors – change in environment (quitting sport), not wanting others to know.</td>
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<td>Arthur-Cameselle &amp; Baltzell (2012)</td>
<td>16 female current or former collegiate athletes from a variety of sports</td>
<td>18-28 ( m=20.70 )</td>
<td>History of a diagnosis of AN ( n = 8 ), BN ( n = 2 ), or EDNOS ( n = 6 ). All participants had to report at least 3 mo remission. Mean length of ED = 32.4 mo.</td>
<td>In depth interview exploring history of ED and the advice they would give to coaches, parents and athletes with regards to ED. Thematic analysis.</td>
<td>-Advised coaches to confront athletes with eating problems, and to improve their knowledge of ED. -Advised parents to focus on providing emotional support and to trust the athlete. -Advised other athletes to maintain hope that recovery is possible, and to identify triggers for the disorder to avoid.</td>
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<tr>
<td>Arthur-Cameselle, Quatromoni (2010)</td>
<td>17 female current or former collegiate athletes from a variety of sports</td>
<td>18-28, ( m=20.70 )</td>
<td>History of a diagnosis of AN ( n = 8 ), BN ( n = 2 ); BED: ( n=2 ); EDNOS ( n=5 ). Mean length of ED = 31.6 mo.</td>
<td>Semi-structured interview study exploring factors related to ED onset. Thematic analysis.</td>
<td>Internal factors related to ED onset: Negative mood, low self-esteem, perfectionism, desire for control. -External factors: Negative influences on self-esteem, hurtful relationships &amp; role models, sport performance. Triggers are similar to those among non-athletes. Performance narrative important to the construction of an elite athlete identity. When athletic identity was threatened by perceived failure (e.g. under performance, injury), this elicited disordered eating thoughts and behaviours. Gender differences in the narratives and emotional impact of disordered eating.</td>
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<td>Busanich, McGannon &amp; Schinke (2013)</td>
<td>One male and one female elite distance runner (NCAA or national level)</td>
<td>19 (m) 34 (f)</td>
<td>No specific recruitment criteria regarding disordered eating. Both athletes described disordered eating behaviours.</td>
<td>Semi-structured narrative interviews. Narrative analysis.</td>
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<tr>
<th>Study</th>
<th>Participants</th>
<th>Age (m/f)</th>
<th>Methodology</th>
<th>Findings</th>
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<tr>
<td>Busanich, McGannon &amp; Schinke (2012)</td>
<td>Nine recreational male ($n = 5$) and female ($n = 4$) distance runners</td>
<td>22-27 (m) 21-28 (f)</td>
<td>Self-identified distance runners. No measure of disordered eating taken.</td>
<td>Narrative interviews about experiences of the body, food and exercise. ‘Just do it’ narrative – recreational, casual, fun. Healthy eating and exercise practices, positive thoughts about their body, and recognising a need to look after it.</td>
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<td>-Just do it better narrative – competitive, serious activity, physical challenge. Weight and food linked to performance. Body management.</td>
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<td>-Gendered and cultural discourses.</td>
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<td>Coppola, Ward &amp; Freysinger (2014)</td>
<td>Eight female elite athletes (skating, sprints, softball and volleyball)</td>
<td>19-25</td>
<td>No measure of disordered eating was taken</td>
<td>In depth semi-structured interviews on the topic of body image and coach communications. Interpretive Phenomenological Analysis.</td>
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<td>-Encouragement of health and fitness</td>
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<td>-Monitoring of physical development and training progressions</td>
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<td>-Weight targets, comparisons and criticisms perceived as unhelpful.</td>
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<td>-Need for individual and athlete centred (as opposed to performance and weight centred) coaching.</td>
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<td>-Athletes tended to pre-empt accounts for their body-regulatory behaviours that help to preserve their positive athlete identities.</td>
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<td>-Failing to produce an account of improvement was received negatively by the physiologists.</td>
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<td>-Athletes are required to show continual improvement and engage in ongoing behavioural change with regards to their body composition.</td>
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<td>Cosh, Crabb, LeCouteur &amp; Kettler (2011)</td>
<td>31 elite level athletes (female $n = 20$). Variety of sports including netball, diving, trampolining, sailing &amp; water-polo.</td>
<td>13-23</td>
<td>No measure of disordered eating was taken.</td>
<td>Audio recording of 40 skinfold testing sessions between athletes and a physiologist. Interactions analysed using discourse analysis.</td>
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De Bruin, Oudejans, Bakker, & Woertman. (2009) 6 current or former elite female athletes from a variety of sports: gymnastics, cycling, dance, track & rowing. 18-26 3 undergoing treatment, 3 recovered. Diagnoses: BN: n=3; EDNOS: n=3. Semi-structured, phenomenological interview focusing on experiences. Thematic analysis conducted. **Factors that contributed towards ED:** -Daily life factors (family & peer influences, identity formation, key transition periods) -Sport influences (athletic body image, ideal body image & athletic identity, performance pressure, weight related pressures from coaches, peers etc. & sport related pressures) -Personal characteristics identified as contributing to the development of ED by elite athletes.

Heaney, O’Connor, Naughton, & Gifford (2008) 46 elite athletes (male n=16) from netball, basketball, diving. 12 elite coaches 16 dietitians 16-45 No measure of disordered eating was taken. Separate focus groups conducted with athletes, coaches and sports dieticians about the barriers to good nutrition in elite athletes. Thematic coding of transcripts and notes. **Barriers to good nutrition:** -Lack of time for food prep, financial issues, poor cooking skills, living arrangements. -Athletes report concern about body shape due to societal pressures; coaches were concerned about excess body weight & effect on performance. -Difficulties around travelling & competition time were raised by sports dieticians & coaches. **Factors relating to onset of ED:** -Disruption of a strong athletic identity as a result of a coach’s critical comment about her weight (turning point). -Prompted body surveillance & self-disciplinary practices (and eventually purging). -Other factors included perfectionism, desire for parental approval, self-doubt, anxiety, and shame in not meeting her coach’s expectations.

Jones, Glintmeyer & McKenzie (2005) Case study of ‘Anne’; a former elite swimmer 28 Clinically diagnosed with bulimia nervosa at 14; ongoing. Interpretive biographical approach. Three interviews held over 4 weeks. **Factors relating to onset of ED:**
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<tr>
<th>Study Authors and Year</th>
<th>Sample Characteristics</th>
<th>Measures of disordered eating behaviours:</th>
<th>Research Design and Data Collection</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerr, Berman &amp; De Souza (2006)</td>
<td>Current ($n=95$) and retired gymnasts ($n=15$), coaches, ($n=28$) parents ($n=62$) and judges ($n=20$)</td>
<td>9% of gymnasts reported use of laxatives or self-induced vomiting 12% restricted food intake 4% used diet pills.</td>
<td>Survey based study with open-ended qualitative questions on perceptions of disordered eating behaviours within gymnastics</td>
<td>Retired gymnasts reported more ED &amp; negative views of their experiences compared to current gymnasts. -The coach was identified as a source of weight pressure, engaging in public weighing &amp; disparaging comments. -Few coaches admitted to engaging in weight monitoring practices, but perceived high levels of monitoring within gymnastics as a whole.</td>
</tr>
<tr>
<td>Krane, Waldron, Michalenok &amp; Stiles-Shipley (2001)</td>
<td>18 female athletes (Div I college athletes, $n=8$) &amp; exercisers ($n=10$). Undergraduate students recruited via snowball sampling technique.</td>
<td>Inclusion criteria specified only athletes without ED or DE history were able to take part in this study.</td>
<td>4 focus group interviews were conducted to explore ideal body image, eating and exercise patterns and emotions.</td>
<td>Most women in the study desired an unrealistic ideal body: toned with minimal fat, but avoiding too much muscularity. Ideal body dependent on context – athletic versus normal social context.</td>
</tr>
<tr>
<td>McMahon, Penney &amp; Dinan-Thompson (2012)</td>
<td>Three elite female swimmers 10-30 years post retirement from swimming</td>
<td>No measure of disordered eating was taken. All three swimmers described disordered eating behaviour when swimming and in retirement.</td>
<td>Autoethnography and narrative framework. Individual construction of stories were discussed in an interview setting with the researcher. Narrative analysis.</td>
<td>-Impact of socio-cultural practices on eating behaviours of swimmers – both within the sporting context and post retirement. -Impact of disciplinary processes on eating behaviours of athletes beyond the sporting context. -Surveillance and normalising of athlete’s bodies; acceptance of monitoring for performance means. -Anxiety of athletes in response to monitoring. Narrative characterised by a struggle to align life experiences with the highly valued ‘performance narrative’. Emotional turmoil as a result of the conflict between performance narrative and her achievements. Self-starvation conceived as a means to achieve.</td>
</tr>
</tbody>
</table>
| Papathomas & Lavallee (2013) | One current elite female basketball player | Disordered eating experiences, but not clinically diagnosed. | Six life history interviews. Narrative analysis. | }
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Description</th>
<th>Age Range</th>
<th>Methodology</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papathomas &amp; Lavallee (2012a)</td>
<td>One former elite female tennis player. 24</td>
<td></td>
<td>Clinical diagnosis of anorexia nervosa at age 19; ongoing. Six life history interviews. Narrative analysis.</td>
<td>Participant revealed a history of sexual abuse by the coach, which was identified by the participant as a trigger for the eating disorder. Athlete had difficulty making sense of her experiences. Potential role of narrative therapy within the treatment context.</td>
</tr>
<tr>
<td>Papathomas &amp; Lavallee (2010)</td>
<td>4 female athletes from athletics, ice skating, figure skating &amp; triathlon. 18-24</td>
<td></td>
<td>Experience of disordered eating. Three athletes cited bulimic episodes, 1 athlete had been clinically diagnosed with BN. In depth semi-structured interviews. Interpretative phenomenological analysis.</td>
<td>- Struggle to disclose. (perceived stigma, shame and embarrassment) - Social support needs (lack of understanding, fear of burdening others, parental support) - Identity challenges (disordered self vs. athletic self, struggle to continue or withdraw, making sense of illness)</td>
</tr>
<tr>
<td>Stirling &amp; Kerr (2011)</td>
<td>17 female currently competitive athletes from a variety of sports. 18-25</td>
<td></td>
<td>Self-reported disordered eating behaviour was verified through discussion in interview; no measure employed. In-depth semi-structured interviews conducted face to face exploring triggers and risk factors for DE. Thematic analysis.</td>
<td>Triggers and risk factors for DE: - Internal factors (self-absorption, achievement orientation, perfectionism, hyper-competitiveness, need for control, enjoyment of pain) - External factors (appearance emphasis, weight pressures, weight monitoring, performance advantages, media influences)</td>
</tr>
</tbody>
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Introduction

Despite the advantages of qualitative research in allowing us to explore individual experiences (Smith, 2008), the focus of much of the qualitative research presented has tended to be surrounding the factors that were important in the development and maintenance of disordered eating disorder among athletes, particularly females (Arthur-Cameselle & Quatromoni, 2010; De Bruin et al., 2009; Jones et al., 2005; Kerr et al., 2006; Stirling & Kerr, 2011). This research has served to confirm many of the findings from the quantitative literature with regards to the potential triggers and maintenance factors of disordered eating in sport, such as critical comments, weight pressures and monitoring processes, low mood and self-esteem, and high levels of perfectionism. There is, however, a move towards conducting more experiential qualitative research, which focuses on understanding the lived experience of athletes with disordered eating (Busanich et al., 2012; 2013; McMahon et al., 2012; Papathomas & Lavallee, 2012; 2013). Such research could have important implications for treatment approaches and interventions, through an improved understanding of the meanings that athletes assign to their experiences (Papathomas & Lavallee, 2012). The focus of research in this area on the antecedents and maintenance factors of eating disorders in athletes has resulted in a limited focus on the experience of eating problems beyond the initial identification stages. For example, there are no known studies that have explored athlete experiences of seeking and receiving treatment for an eating disorder, and similarly just one study that has focused on recovery experiences (Arthur-Cameselle & Quatromoni, 2014). This is important to ensure that the processes are in place to assist athletes in seeking appropriate support, where potential eating problems are suspected.

In addition, it is noticeable that much of the qualitative research in this area has been conducted with female elite athletes, with limited investigation with male athletes, or with athletes at sub-elite levels. The male athlete experience of eating disorders is likely to be different to that of the female athlete (Busanich et al., 2013) and as yet there is limited understanding as to how these experiences might differ. Similarly, whilst coach actions and behaviours have been identified as a potential trigger for eating psychopathology, few studies have explored the nature of the coach-athlete relationship, athlete perceptions of their coach, and the coach’s role and reaction with regards to their eating issues. The coach plays a powerful role in the development of the athlete, and is in an ideal position to facilitate the early identification of potential eating problems (Selby & Reel, 2011). Investigating athlete perspectives on how coaches can facilitate or hinder the disclosure and treatment seeking process could help to inform coach education in terms of how best to approach and manage an athlete whom they suspect of disordered eating behaviours.

1.1.0.1 Summary: Experiences of athletes with eating problems

Understanding the lived experience of the individual athlete with an eating problem is of critical importance in furthering our knowledge of some of the challenges and issues that athletes face (Papathomas & Lavallee, 2012a). Such research can therefore be critical in the development
of appropriate prevention and intervention programmes specifically for the athlete population. However, maintaining an exclusive focus on the individual may perpetuate the poor reputation that has often been attributed to coaches, in relation to their role in eliciting disordered eating in athletes (e.g., Jones et al., 2005 and McMahon & Dinan-Thompson, 2011). High expectations are often placed on coaches with regards to identifying and managing potential eating problems in athletes (Selby & Reel, 2011); however it is not yet known how coaches themselves perceive their role, and whether or not they have the skills and support necessary in order to be able to carry out their role.

1.11 Conclusions

This literature review has identified several areas for further research with regards to eating psychopathology among athlete populations. In particular, the review presented considerable evidence to support a causal and maintenance role of exercise within the eating disorders. The model of compulsive exercise proposes that exercise within the eating disorders is multidimensional, with cognitive and behavioural motivations important in maintaining unhealthy exercise behaviours. Extensive evidence supports the association between compulsive exercise and eating psychopathology among exercisers, but the model has yet to be considered amongst an athlete population. It may represent a more valid conceptualisation of exercise and eating psychopathology among athletes than previous models of ‘excessive exercise’ that highlighted the frequency and duration of exercise in associations with eating psychopathology. As changes to exercise attitudes and behaviours are commonly observed prior to the development of eating psychopathology, monitoring and assessing exercise attitudes in athletes may offer a method of early identification of those who are potentially vulnerable to the development of eating problems.

In addition, the findings from this literature review suggest that the focus of eating disorders in sport research is currently heavily weighted towards establishing the prevalence of eating disorders and disordered eating across a variety of athlete groups. Both quantitative and qualitative research has identified a number of risk factors for eating disorders that are specific to the sporting context, such as weight pressures from coaches and peers, personality factors such as a high level of perfectionism, and triggers such as injury, which can elicit disordered eating behaviours. However, the literature is currently limited by significant heterogeneity in the athlete samples investigated, and the criteria utilised to establish the presence of eating psychopathology. There has been a recent shift towards experiential research to explore in more depth eating attitudes and behaviours within the sporting context. This has primarily been conducted from the perspective of the athlete, and has focused on exploring the development and maintenance factors associated with eating disorders, as opposed to disclosure, treatment seeking and recovery processes. Given the importance assigned to the role of the coach in identifying and managing
potential eating problems in athletes, their perspectives and experiences have been comparatively neglected. The areas of investigation of this thesis are shown in Figure 1.5.

1.12 Broad aims of the thesis

The overall aim of this thesis is to improve our empirical understanding of the identification and management of eating problems in athletes. The literature review has identified areas that warrant further investigation (Figure 1.5). The overall aim of the thesis will be achieved by investigating three broad research questions (see Figure 1.6).

1. What is the link between exercise attitudes and eating psychopathology in athletes, and how can we measure it?

First, this thesis aims to explore the relationship between exercise attitudes and eating psychopathology in athletes, and to evaluate the validity of a measure that may help to identify eating problems in athletes. Specifically, it aims to examine the validity of the recently developed multidimensional model of compulsive exercise within an athlete population, and to explore how exercise beliefs and eating psychopathology might be related in this group. It also aims to establish whether a measure of exercise attitudes is sufficiently specific and sensitive to detect those athletes with elevated levels of eating psychopathology.

2. How do coaches currently identify and manage eating problems in athletes?

Second, this thesis aims to explore the experiences of coaches in identifying and managing eating problems in athletes, to establish how eating problems are currently identified among athletes, and the strategies and procedures that coaches adopt once an eating problem has been established. It also aims to identify the challenges and barriers that coaches face when identifying and supporting athletes with eating problems.

3. How do athletes experience eating disorders?

Finally, this thesis explores the perspectives of athletes with eating disorders, particularly focusing on elements of disclosure, treatment seeking and recovery, which have, as yet, been relatively neglected in the literature. It aims to identify the challenges athletes face in disclosing eating problems, and to further our understanding of how athletes experience seeking and receiving treatment.
Figure 1.5 Factors influencing eating psychopathology in athletes to be explored in this thesis

- Coach strategies of identification
- Athlete disclosure experiences
- Identification of potential eating disorder
- Management of eating problems in athletes
- Coach responses to potential eating problems
- Athlete experiences of seeking and receiving treatment
- Exercise attitudes (Compulsive Exercise Test)
- Development & maintenance
- Emotion regulation

Key:
- Solid line: Part 2 of the thesis
- Dashed line: Part 3 of the thesis
- Dashed-dotted line: Part 4 of the thesis
1.13 Specific aims of the thesis: Links with studies (Figure 1.6).

The specific aims of each study contained within this thesis are as follows:

1. To explore the validity of the model of compulsive exercise (Meyer et al., 2011) within an athlete population and to assess links with eating psychopathology (Study 1).

2. To assess whether the Compulsive Exercise Test is a suitable screening measure for detecting athletes with elevated levels of eating psychopathology (Study 2).

3. To assess a potential mediating role for compulsive exercise in the relationship between emotion regulation and eating psychopathology in athletes and non-athletes (Study 3).

4. To explore the current strategies and methods that coaches utilise when identifying disordered eating among their athletes (Study 4).

5. To explore the responses and strategies that coaches employ when dealing with an athlete with an eating problem (Study 5).

6. To explore athlete experiences of disclosing an eating disorder (Study 6).

7. To explore athlete experiences of seeking and receiving treatment for an eating disorder (Study 7).
Figure 1.6 Focus and studies of the present thesis

- **Research Question**
  - What is the link between exercise attitudes and eating psychopathology in athletes, and how can we measure it?
  - How do coaches currently identify and manage eating problems in athletes?
  - How do athletes experience eating disorders?

- **Objective**
  - To explore the validity of the Compulsive Exercise Test for athletes
  - To assess whether the Compulsive Exercise Test can be utilised as a screening measure to detect eating psychopathology in athletes
  - To explore the potential mechanisms by which compulsive exercise and eating psychopathology are linked
  - To explore methods of identification of eating problems in athletes by coaches
  - To explore methods of management of athlete eating problems by coaches
  - To explore athlete experiences of disclosing an eating disorder
  - To explore athlete experiences of treatment for an eating disorder

- **Sample**
  - 702 athletes
  - 532 athletes
  - 15 athletes with a current eating disorder
  - 262 athletes
  - 237 non-athletes
  - 11 track and field coaches
  - 15 athletes currently seeking treatment for an eating disorder

- **Methods**
  - Confirmatory and exploratory factor analysis, regression
  - Receiver operating curve analysis
  - Mediation analysis
  - Thematic analysis of semi-structured interviews (qualitative)
  - Interpretive Phenomenological Analysis of semi structured interviews (qualitative)

- **Chapters**
  - Chapter 3 Study 1
  - Chapter 4 Study 2
  - Chapter 5 Study 3
  - Chapter 6 Study 4
  - Chapter 7 Study 5
  - Chapter 8 Study 6
  - Chapter 9 Study 7
Chapter 2  General Methodology

2.1  Introduction

This chapter describes the methodology employed to explore the aims of this thesis. The chapter critically reviews the various methodological approaches utilised in the literature, and provides a rationale for the specific methods employed within this thesis. In addition, an overview of the research design and recruitment methods is provided and the ethical considerations and procedures are outlined. The thesis incorporates a mixed methods approach, whereby a variety of quantitative and qualitative methods have been employed. The chapter is therefore divided into two sections: qualitative and quantitative.

The quantitative methods section describes the psychological measures that are frequently used to assess eating psychopathology and compulsive exercise among athletes, and justification for the measures chosen for use within this thesis. An overview of the quantitative data analysis strategy is also provided. The qualitative methods chosen are also described and evaluated, with a description of the data collection and data analysis strategy.

2.2  Design

A cross sectional study design was used in all studies within this thesis, and was deemed appropriate for a number of reasons. While longitudinal studies can establish a temporal relationship between potential risk factors and the proposed outcome variable, such studies are often costly to run, can take many years to complete, and usually require very large sample sizes to account for dropout and to allow for the identification of new cases (McKnight Investigators, 2003; Schneider, 1989). The number of athletes within treatment settings has yet to be reported within the scientific literature, however through discussions with eating disorder clinicians it was anticipated that there would be only small numbers of athletes within eating disorder treatment settings. As such, it was likely to be very challenging to recruit sufficient participants to take part in a longitudinal study. As several of the research questions within this PhD were exploratory and novel within the context of athlete eating psychopathology, a cross-sectional, snapshot design was deemed as an appropriate first step (Kazdin, 2010; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008). It is acknowledged that such an approach cannot infer true cause and effect, or indeed determine the temporal relationship between factors, but instead can indicate an association between variables that could prompt further investigation. It is envisaged that future research building on the results of this work will employ longitudinal and experimental designs to further explore eating psychopathology in athletes, both within clinical and non-clinical populations.
2.3 Ethical considerations

Ethical approval was sought and permitted from the NHS Research Ethics Committee for the studies involving clinical participants (Studies 2, 3, 6, and 7). The letter of approval is included in Appendix A. Each Research and Development department at the participating NHS Trusts (Birmingham, Leicester and Northampton) also granted approval for the studies to take place. Loughborough University Research Ethics Committee provided approval for recruiting participants from eating disorder support services (non-NHS) and for all studies including non-clinical samples (Studies 1-5; see Appendix B). In every study, participants gave fully informed consent, after being informed of the aims of the study and what would be involved, as well as having the opportunity to directly ask questions, or contact the researcher with any concerns. Participants were also made aware that their participation was voluntary, and that they had the opportunity to withdraw at any time, without having to provide a reason to the researcher, and without it affecting their treatment or clinical care. Where paper-based questionnaires were completed and/or interviews were conducted, this involved completing a written consent form to indicate their willingness to participate. A written consent form was provided by all participants in studies 4, 5, 6 and 7. Participants who completed a paper copy of a questionnaire in studies 1-3 also provided written consent. An example information and consent form is provided in Appendix C. Studies 1-3 were also available to complete anonymously online. For these studies, participants were primarily provided with information about the aims and what the study would involve. As with the written consent form, online participants were informed that they could withdraw from the study at any time, simply by contacting the researcher. They were then asked to check a box, which indicated that they had read this information and that they consented to take part.

All of the participants remained anonymous throughout the research procedure. All written consent forms with potentially identifying information were stored in a locked filing cabinet, and kept separate from completed questionnaires and interview transcripts in all studies. Similarly, the data from all of the studies, including interview transcripts, audio files and questionnaire data was kept on a password protected computer, in accordance with the Data Protection Act (1998). Coaches and athletes who took part in studies 4, 5, 6, and 7 were offered travel reimbursements if they attended an interview either at an eating disorder service or at Loughborough University.

2.4 Participants

2.4.1 Inclusion and exclusion criteria for all participants

For participants to take part in the studies within this thesis, a number of criteria were specified. Firstly, it was required that the first language of all participants was English, and all participants had to be over the age of 18 years. In studies 1, 2, and 3, athlete participants were
required to be currently training for and competing in one particular sport (and to have been doing so for a minimum of six months). Recreational exercisers were therefore excluded from athlete samples. Control participants were required to not be taking part in any competitive sport. In studies 4 and 5, the participants were required to be coaching track and field for a minimum of an hour a week; and to have had an experience of coaching an athlete with an eating problem. In studies 6 and 7 participants were required to be currently seeking treatment for an eating disorder, either at an eating disorder support service, or at a clinical eating disorder service within the National Health Service. They were also required to be currently training for and competing in one particular sport, or to have had a history of doing so prior to the onset of their eating disorder. Finally, they were required to have a coach who directed their training.

2.4.2 Recruitment procedure: Non-clinical athletes and controls

Non-clinical athletes and controls were recruited using the following methods:

Non-clinical athletes.

Athlete participants (for studies 1, 2 and 3) were recruited from sports clubs and teams at British universities and in the community. Secretaries and presidents of each sport club were contacted via email with information about the study and asked if they would be able to send the information around to their members. This included the information sheet, a link to the online survey and the researcher’s contact details if potential participants wished to discuss the study further. Participants were also able to request a hard copy of the questionnaire if they would prefer to complete the questionnaire by hand rather than online. The study was also advertised on various poster boards in sporting facilities at Loughborough University and in local sports centres, with flyers for people to take with a link to the online questionnaire. Flyers were also distributed at local sporting events such as track and field matches and in ‘Finishers’ goody bags at the end of local road races. The researcher also attended various group training sessions and distributed the questionnaire to interested participants, after approval from the relevant coach. Finally, athlete participants were also recruited via university email distribution lists, where interested participants could either complete the questionnaire online or request a hard copy of the questionnaire.

Non-clinical control participants.

Control participants for study 3 were primarily recruited from Loughborough University School of Sports Exercise and Health Sciences. One hundred participants were approached by the researcher during a lecture on statistics, of which ninety one agreed and completed a written questionnaire after the lecture. In addition, participants were recruited through a research participation scheme for first year undergraduate students. Students can volunteer to take part in a variety of research studies in exchange for course credits. Non-athlete participants were also
recruited via university email distribution lists, and a psychology postgraduate forum, where information about the study aims was provided, alongside a link to the online questionnaire. Potential participants were able to request a paper copy of the questionnaire to complete if they preferred. Participants were classified as controls (non-athletes) if they described any identified exercise behaviour as non-competitive (recreational).

**Diagnosis and screening: Non clinical athletes and controls.**

In studies 1, 2, and 3, athletes were defined as those currently engaging in training and competition for one particular sport. Control participants were therefore those engaging in exercise at a recreational (non-competitive) level only. All athletes and controls were asked to indicate on the questionnaire whether they had previously had, or were currently suffering from an eating disorder. All participants also completed the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994; 2008; Appendix D), to provide an assessment of their eating behaviours and attitudes. The percentage of participants reporting a previous or current eating disorder among both athlete and control groups was recorded. These participants were excluded from study 2, where eating disorder status needed to be verified in order to determine an appropriate cut off on the Compulsive Exercise Test. However, these participants were retained in studies 1 and 3 to ensure a wide range of eating psychopathology was represented in the sample.

**2.4.3 Recruitment: Coaches**

Participants for studies 4 and 5 were recruited from UK sports teams and clubs. Secretaries for sports clubs were initially contacted via email or telephone by the researcher. Information about the study was provided, and the sports club contacts were asked if they would be willing to pass on the information to the coaches at their club, either via email distribution lists or by putting up a poster about the study in their club. Some clubs offered to advertise the study on their website. Potential participants were then able to contact the researcher for additional information about the study. Alternatively, coaches were approached at coach and athlete education events and workshops. They were given an information sheet to take away and read. Potential participants provided their contact details if they were interested in the study. The researcher then contacted them a minimum of 24 hours later to consider their participation. If participants agreed to participate, a date for a telephone or face-to-face interview was set.

**2.4.4 Recruitment: Athletes with current eating disorders**

Participants with eating disorders were recruited from the Leicester, Birmingham and Solihull and Northampton NHS Eating Disorder Services for a qualitative exploration of their treatment experiences and their interaction with their coach in the context of their eating disorder.
General Methodology

The participants also completed some questionnaire measures as part of studies 2 and 3. Participants were receiving treatment in one of the following forms: inpatient care; day care at a regional hospital; or outpatient treatment from a local NHS eating disorder clinic or support service. A clinician at each of the eating disorder services was contacted and asked to circulate information about the study to fellow clinicians, to aid identification of any potential clients who met the inclusion criteria. Once a potential participant had been identified and the clinician had confirmed that the participant was well enough to take part, the clinician was able to pass on the information sheet and interest in participation form to their client. The participants then returned this form to their clinician if they were interested in taking part, or alternatively were able to directly contact the researcher if they had additional questions. The researcher was then able to liaise with the participants and describe the research study more fully. Participants had a minimum of 24 hours to consider whether they would like to take part; if they agreed to participate then a date for the interview was arranged, which took place in the service where they were accessing treatment. Participants were able to complete the questionnaire measures either in advance of the interview date, or at the time of the interview.

Participants were also recruited from an NHS eating disorder support service. The eating disorder support service that was approached is a voluntary organisation that provides support to people with self and/or clinically diagnosed eating disorders, through the provision of support and discussion groups, coffee mornings, drop in sessions, support buddies, group activities and online support networks. The study was advertised on the service’s Facebook page and interested clients were able to contact the researcher directly for more information about the study. The researcher also attended a support group to inform clients about the study, and gave out information sheets, interest in participation forms and the researcher’s contact details to interested clients. Participants were then able to return the interest in participation form and discuss any concerns with the researcher directly prior to organising an interview date if they were still keen to participate. The interviews were conducted at the service. All of the participants recruited from the support service were currently accessing support groups and outpatient treatment at the time of the interview. In addition, all of the participants recruited from the support service reported a history of hospital admission as a result of their eating disorder.

Diagnosis and screening: Clinical athlete sample

Athletes who formed the clinical sample, (included in studies 2, 3, 6 and 7) were asked to report their current diagnosis. Some of the participants described several stages to their eating disorder history, where their diagnosis changed; in these cases, their most recent diagnosis was reported. For participants recruited through eating disorder support services, eating disorder diagnosis was self-reported; however participants were asked to indicate how recently this diagnosis was given. All of these participants recruited from the eating disorder support service
General Methodology

were currently receiving outpatient therapy. All participants for the clinical study completed the EDE-Q (Fairburn & Beglin, 1994; 2008; Appendix D) to provide an up to date assessment of their eating attitudes and behaviours. Athletes within the clinical sample also completed measures of their exercise attitudes and behaviours (Compulsive Exercise Test, athlete version; Plateau et al., 2014 (Study 1); Appendix E) and a measure of emotion regulation (Difficulties in Emotion Regulation Scale; Gratz & Roemer, 2004; Appendix F).

2.5 Quantitative measures

For the quantitative studies in the thesis, a number of different questionnaires were considered prior to selecting the chosen measures. This section will outline the measures that were considered to assess eating behaviours, exercise attitudes, and emotion regulation, as well as providing justification for the measures that were eventually chosen and used within this thesis.

2.5.1 Demographic questionnaires

All athletes and non-athletes

Demographic information from the participants was collected in both quantitative and qualitative studies to ensure the participants could be described fully. In addition to age and gender, athlete participants provided their height and weight in order for Body Mass Index (kg/m²) calculations to be computed. Due to the high proportion of participants completing questionnaires online, it was not plausible to objectively measure height and weight. Participants also provided information on their level of sports competition, the type of sport they did (if any) and information on previous or current eating disorders. Participants also indicated whether their first language was English and described their ethnicity. An example of the demographic form is provided in Appendix G.

Coaches

Coach participants in studies 4 and 5 provided information on their coaching history, qualifications and current coaching commitments. Coaches provided information about the groups of athletes that they currently coached, including their ages and level of competition. Finally, coaches were also asked to provide information about their current weight monitoring strategies, and their experience of coach education in the area of disordered eating in sport. An example of the demographic questionnaire used with coaches is provided in Appendix H.
2.5.2 Measures of eating disorder behaviours and cognitions

The accepted ‘gold-standard’ for the assessment and diagnosis of eating disordered behaviours and cognitions within eating disorders research and within the therapeutic environment is the Eating Disorders Examination (EDE; Fairburn & Cooper, 1993). This is a semi-structured interview that is conducted by an experienced clinician, therapist, or researcher who is specifically trained in using this tool (Fairburn & Cooper, 1993). Other, more generic psychiatric interviews that use DSM-IV criteria to establish the presence of an eating disorder are occasionally used, such as the Composite International Diagnostic Interview (CIDI; Robins et al., 1988) and the Structured Clinical Interview (SCID-I; First, Spitzer, Gibbon, & Williams, 2002). Clinical interviews have been accepted as the most effective way of establishing a diagnosis of an eating disorder in comparison to self-report measures (Fairburn & Beglin, 1994; Greeno, Marcus, & Wing, 1995; Mond, Hay, Rodgers, Owen, & Beumont, 2004; Passi, Bryson, & Lock, 2003), however, interviewing procedures are time consuming, costly, require extensive training, and lack feasibility when screening for eating disorders within a large sample (e.g., Wilfley, Schwartz, Spurrell, & Fairburn, 1997). As such, a number of self-report measures have been developed, which are often employed both within research and clinical settings to overcome some of the challenges of employing interview procedures. Self-report measures that are commonly used to assess eating psychopathology among athletes are outlined below, and their strengths and limitations acknowledged. The measure that has been employed within this thesis has been presented first, which is the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994, 2008).

The Eating Disorder Examination Questionnaire Version 6.0 (EDE-Q; Fairburn & Beglin, 1994; 2008; Appendix D).

The EDE-Q is a self-report questionnaire derived from the Eating Disorder Examination; (EDE; Fairburn & Cooper, 1993). The EDE is an investigator based interview schedule considered to be the gold standard in assessing eating disorders. Version 6.0 of the EDE-Q is the most recent version and constitutes a 28-item measure of self-reported eating attitudes and behaviours (Fairburn & Beglin, 2008). The EDE-Q 6.0 assesses eating psychopathology across four domains; Restraint, Eating Concern, Shape Concern and Weight Concern, which constitute the four subscales of the measure. It uses a 7-point forced choice rating scheme, exploring eating behaviours and attitudes in the preceding 28 days, anchored by 0 (No days) and 6 (Every day). The Global Score is the mean of the four individual subscale scores.

In addition to exploring eating attitudes, the EDE-Q also assesses eating disordered behaviours, such as engaging in binge eating, self-induced vomiting, the use of laxatives and driven exercise. An example item is “Have you been deliberately trying to limit the amount of food you eat to influence your shape and weight?” A high score on the EDE-Q is indicative of higher levels of pathological eating behaviours and beliefs. Various cut-offs have been proposed and
utilised within the eating disorders literature to determine the presence of a clinically significant eating problem. A variety of different cut-offs have been proposed, for example; Mond and colleagues (2004) suggested a global score of 2.3 in conjunction with the occurrence of any OBES and/or use of exercise as a method of weight control was the best predictor of an eating disorder diagnoses when compared with the interview. Another commonly used cut-off to indicate a clinically significant eating disorder is a global score of four or more (Carter, Stewart, & Fairburn, 2001; Lavender, De Young, & Anderson, 2010; Luce, Crowther, & Pole, 2008; Mond, Hay, Rodgers, & Owen, 2006).

When compared to the EDE, the EDE-Q has been found to be reliable in assessing the fundamental components of eating psychopathology in both clinical and non-clinical populations (e.g., Binford, Le Grange, & Jellar, 2005; Mond et al., 2008; Reas, Grilo, & Masheb, 2006). The EDE and the EDE-Q have been found to be highly correlated, although the EDE-Q can overestimate the presence of eating disorders (Mond et al., 2004; Passi et al., 2003). The EDE-Q has shown high internal consistency ($\alpha = 0.85$) and test-retest reliability (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004).

**Use of the EDE-Q in athlete groups.**

The EDE-Q has previously been used with athletes to assess eating psychopathology, and has demonstrated acceptable levels of internal reliability and consistency (e.g., Hulley, Currie, Njenga & Hill, 2007; Hulley & Hill, 2001; Shammugam, Jowett & Meyer, 2012; 2013; 2014). However, the test-re-test reliability of the measure has yet to be established among athletes, with longitudinal and follow up studies few and far between (Bratland-Sanda & Sundgot-Borgen, 2013). The original four-factor structure of the EDE-Q was employed in this thesis, to allow for comparison with other studies within the field. A recent factor analysis of the EDE-Q with a large sample of athletes proposed alternative factor structures for male and female athletes in comparison to controls (Darcy, Hardy, Crosby, Lock & Peebles, 2013). However, this proposed three-factor structure has yet to be demonstrated as appropriate for athletes across a variety of sports and competitive levels, hence was not adopted in this thesis.

The accuracy of questionnaire based measures such as the EDE-Q in detecting eating disorder caseness in athletes has been questioned, as increased numbers of false positives have been found to occur among athletes (Sundgot-Borgen & Torstveit, 2004). In contrast, it has also been found that athletes can underreport disordered eating attitudes and behaviours (Brownell & Rodin, 1992; Johnson, Powers & Dick, 1999) and that this is more common in athletes in comparison to controls (Sundgot-Borgen, 1993). Such underreporting has been proposed to be due to fears of exclusion from training or competition or a loss of financial support (Hulley & Hill, 2001; Hulley et al., 2007). Whilst using clinical interviews is preferable for determining eating disorder status among athletes (Bratland-Sanda & Sundgot-Borgen, 2013), this is difficult to
achieve with large samples. The EDE-Q can indicate caseness and key behavioural features in addition to providing an indication of the level of psychopathology, which sets it apart from other measures of eating attitudes and behaviours. It is also commonly used within clinical settings (e.g., Mond et al., 2008).

The Eating Attitudes Test-26 (EAT-26; Garner & Garfinkel, 1979; Garner, Olmsted, Bohr, & Garfinkel, 1982).

A second measure that was considered to evaluate eating psychopathology among athletes and non-athletes was the Eating Attitudes Test -26. The original version of the Eating Attitudes Test consisted of forty items (Garner & Garfinkel, 1979) and was primarily developed to detect and diagnose anorexia nervosa. It was later updated with a reduced length, 26-item version, (Garner et al., 1982) which is now commonly used to screen for pathological eating attitudes in non-clinical samples, as opposed to the longer, forty item version. For the 26-item version of the EAT, answers are rated on a 6 point Likert scale, anchored by 0 (never) to 6 (always) to indicate level of agreement with the statements. Higher scores indicate higher levels of eating disorder symptoms. An example item is: “I have gone on eating binges where I feel that I may not be able to stop.” The measure is commonly used to screen for eating disordered signs and symptoms within the normal population but is not recommended for use as a diagnostic tool (Garner et al., 1982). Indeed, the EAT-26 has been found to produce a high false positive rate when used with non-clinical groups (Mintz & O'Halloran, 2000.) The EAT-26 items form three subscales: (a) Dieting, (b) Bulimia and Food Preoccupation; and (c) Oral Control. The subscales scores are calculated by summing all items assigned to that particular scale. The total score can be calculated by summing scores for all of the items. A cut-off of 20 or more on the EAT has been used as an indicator of clinical severity; the test authors recommend that individuals scoring above this cut-off should seek professional advice (Garner et al., 1982). The EAT-26 (Garner et al., 1982) also includes four behavioural questions to test for the presence of pathological weight control behaviours, and to assess their relative frequency. These questions assess self-reported bingeing, self-induced vomiting, use of laxatives and treatment for an eating disorder in the preceding 6 months. This may allow for some limited comparison with the DSM-IV diagnostic criteria for the presence of bulimia nervosa (APA, 2000). Scoring above the threshold for the behavioural criteria was also identified as an indicator of clinical severity by the test authors (Garner et al., 1982).

Use of EAT-26 to assess eating psychopathology in athlete groups

The EAT-26 has been occasionally used with athlete samples, however this is often in combination with another measure of eating psychopathology, such as the body dissatisfaction scale of the Eating Disorders Inventory (e.g., Bachner-Melman, Zohar, Ebstein, Elizur, & Constantini; 2006; Beals & Manore, 2002; Picard, 1999; Rouveix, Bouget, Pannafieux, Champely...
& Filaire, 2007). In more recent studies, the EDE-Q and the EDI-2 tend to be the measures of choice for assessing eating psychopathology in athletes (e.g., Martinsen & Sundgot-Borgen, 2013; McLester, Hardin & Hoppe, 2014; Shanmugam et al., 2012; 2013; 2014). Whilst the EAT-26 has been modified to allow some comparison with diagnostic criteria, its high false positive rate among non-clinical samples is concerning (Mintz & O’Halloran, 2000). Indeed, it has been suggested that the emphasis placed on the overall score and its associated cut-off to detect eating psychopathology, has resulted in key behavioural and symptom information being overlooked (Anderson & Williamson, 2002). As a consequence it was not deemed suitable as a measure of eating psychopathology for the studies within this thesis.

Eating Disorders Inventory (EDI; Garner, Olmstead & Polivy, 1983).

The original Eating Disorders Inventory was a 64-item self-report multiscale measure that was designed to assess the psychological and behavioural aspects of anorexia and bulimia nervosa. The original measure consisted of eight subscales, which were as follows: (a) Drive for Thinness, (b) Bulimia, (c) Body Dissatisfaction, (d) Ineffectiveness, (e) Perfectionism, (f) Interpersonal Distrust, (g) Interoceptive awareness and (h) Maturity fears. A revision to the EDI was conducted in 1991, increasing the number of items on the measure to 91 (EDI-2; Garner, 1991). Three additional subscales were included on the second edition, including Asceticism, Impulse Regulation and Social Insecurity. The EDI-2 is the most commonly used version of the Eating Disorders Inventory, and has been found to reliably distinguish between patients and controls (Schoemaker, Verbraak, Breteler & Van der Staak, 1997), and also between diagnostic categories in clinical groups (Nevonen, Clinton & Norring, 2006). The EDI-2 has also been found to be valid cross-culturally, and the factor structure has been replicated in both Western and non Western samples (Podar & Allik, 2009).

The most recent version of the Eating Disorders Inventory (EDI-3; Garner, 2004) uses the same 91 items as the EDI-2, but the factor structure and subscales have been updated. Twelve subscales are proposed, with Garner (2004) suggesting two groups of subscales. Drive for Thinness, Body Dissatisfaction and Bulimia are categorised within the eating disorder specific category, whilst more general psychological risk factors form the second category. This includes (a) Low self-esteem, (b) Personal alienation, (c) Interpersonal insecurity, (d) Interpersonal alienation, (e) Interoceptive deficits, (f) Emotional dysregulation, (g) Perfectionism, (h) Asceticism and (i) Maturity fears. Answers are given on a 5-point Likert scale, where higher scores are indicative of higher levels of eating psychopathology. An example item of the EDI-3 is “I am preoccupied with the desire to be thinner”.

The EDI-3 has shown good internal consistency, discriminative ability and sensitivity and specificity in distinguishing between patients and controls, and in distinguishing between patient groups (Clausen, Rosenvinge, Friborg & Rokkedal, 2011). Clausen and colleagues (2011) used
receiver operating curve analysis to suggest appropriate cut-offs on each of the twelve subscales to distinguish between patients and controls. For the three eating specific subscales, (Drive for Thinness, Body Dissatisfaction and Bulimia) suggested cut-offs were 16, 15 and 9 respectively.

Use of the EDI to assess eating psychopathology in athlete groups

The EDI has been commonly been used in investigations exploring eating psychopathology in athletes, however there is considerable variation in terms of the cut-off values utilised; the version of the EDI used; the definition of eating psychopathology (e.g. ‘at risk’ vs. clinical significance); and which individual subscales are employed (e.g., Black, Larkin, Coster, Leverenz & Abood; 2003; Byrne & McLean, 2002; Johnson et al., 1999; Monsma & Malina, 2004; Torstveit et al., 2008). This lack of consensus as to the most appropriate way in which to use the EDI with athletes was the main reason why it was not employed within this thesis. In addition, the full version of the EDI includes 91 items, which was felt to be too long for screening for eating psychopathology among athlete samples.

Bulimia Test-Revised (BULIT-R; Thelan, Farmer, Wonderlich & Smith, 1991)

The original Bulimia Test is a 36 item self-report questionnaire that was based on the DSM-III criteria for bulimia nervosa (Smith & Thelan, 1984), however it is the revised version of the measure that is most commonly used (Thelan et al., 1991). The revision incorporates the changes made to the diagnostic criteria in DSM-III-R and subsequently DSM-IV (Thelan, Mintz & Vanderwal, 1996). The Bulimia Test Revised (BULIT-R) is a 36-item self-report questionnaire, 28 of which are scored items that reflect the DSM criteria, and a further eight unscored items that relate to specific weight control behaviours. It is scored on a 5-point Likert-type scale from 1-5, with higher responses indicating a greater degree of symptom severity. The measure also allows for classification of bulimia nervosa, with a recommended cut-off of 104 (Thelan et al., 1991). An example item is: “Do you feel you have control over the amount of food you consume?”

With regards to the psychometric validity of the measure, the BULIT-R can successfully distinguish between patients and controls (Thelan et al., 1991; 1996) and has shown good reliability on test-retest (Thelan et al., 1991). It has also been found to be reliable and valid to use across diverse ethnic groups (Fernandez, Malacrne, Wilfley, & McQuaid, 2006) and among both adult and adolescent populations (Vincent, McCabe & Ricciardelli, 1999).

Use of the BULIT-R to assess eating psychopathology in athlete groups

The BULIT-R has been used to assess pathogenic weight loss measures and bulimic symptoms among both male and female athletes (e.g., Black et al., 2003; Greenleaf, Petrie, Carter & Reel, 2009; Petrie, Greenleaf, Reel & Carter, 2008). The measure is most often used in conjunction with other measures of eating psychopathology, such as the Questionnaire for Eating
Disorder Diagnoses, or the Drive for Thinness scale of the EDI, as a specific measure of bulimic signs and symptoms (e.g. Byrne & McLean, 2002; Greenleaf et al., 2009; Petrie et al., 2008). The BULIT-R was not employed as a measure of bulimic symptoms in this study. Bulimic features are assessed within other measures of eating psychopathology, such as the EDE-Q, and it was deemed unnecessary to employ a separate measure to specifically evaluate bulimic symptoms.

**Questionnaire for Eating Disorder Diagnoses (Q-EDD; Mintz, O’Halloran & Mulholland, 1997)**

The Questionnaire for Eating Disorder Diagnoses (Q-EDD; Mintz et al., 1997) is a self-report questionnaire that includes 50 items. The questionnaire was designed to operationalise the DSM-IV criteria for eating disorder diagnoses. In particular, the measure aims to differentiate between those with and without an eating disorder diagnosis; distinguish between those with an anorexia nervosa diagnosis from those with a bulimia nervosa diagnosis; and between eating disordered, symptomatic and asymptomatic individuals (Mintz et al., 1997). The Q-EDD provides frequency information for key eating disordered behaviours such as laxative use and self-induced vomiting, and participants can be categorised into ‘eating disordered’ or ‘non-eating disordered’ groups. Items are scored according to a concurrent scoring manual, which consists of a series of decision rules –items are dichotomously scored according to whether they meet individual DSM-IV criteria. For example, the anorexia nervosa criteria from DSM-IV states that body weight must be less than 85% of expected for their height. Therefore, a BMI of below 17.5kg/m² is defined as a positive response to the QEDD decision rule and in line with DSM-IV criteria for AN.

With regards to the convergent and discriminatory validity of the measure, assigned classifications from the Q-EDD have been found to correspond closely with scores on the EAT-40 and the BULIT-R, and also in comparison to diagnoses made via clinical interview (Mintz et al., 1997) Test-retest reliability and interscorer agreement were also found to be very good. It is proposed as an appropriate screening measure for eating psychopathology among non-clinical groups, but it was found to be poor at distinguishing the symptomatic classification from eating disordered and asymptomatic individuals (Mintz et al., 1997).

**Use of the Q-EDD to assess eating psychopathology in athlete groups**

The Q-EDD has been relatively infrequently used within the athlete population, perhaps due to the focus of the measure in distinguishing eating disorder diagnoses, as opposed to screening for eating disorders among the community (Mintz et al., 1997). The studies that have used the Q-EDD with athletes have sought to establish the prevalence rates of clinical eating disorders among athletes from a variety of sports and across competition levels (e.g., Greenleaf et al., 2009; Hausenblas & McNally, 2004; Petrie et al., 2008; Sanford-Martens, Davidson, Yashuko, Martens & Hinton, 2005). Whilst few athletes were identified as having clinical eating disorders using this measure, up to 25% of athletes have been classified as symptomatic (e.g., Hausenblas &
General Methodology

McNally, 2004; Greenleaf et al., 2009; Sanford-Martens et al., 2005). The Q-EDD was not chosen as a measure of eating psychopathology in this thesis due to the infrequent use of this measure within the literature, and due to concerns in its ability to distinguish between clinical and subclinical eating disorders among non-clinical samples.

Eating Disorders Diagnostic Scale (EDDS; Stice, Telch, & Rizvi, 2000)

The EDDS was developed in reaction to the increasingly lengthy questionnaires being utilized to assess eating psychopathology both in clinical and community settings (Stice et al., 2000). It was designed as a tool that could diagnose and distinguish clinical eating disorders, and was primarily adapted from the EDE (Fairburn & Cooper, 1993) and the eating disorders module of the SCID-I (First et al., 2002). The test-re-test, internal consistency and convergent validity of the EDDS have been found to be good (Stice et al., 2000), and additional evidence supports the discriminatory and predictive validity of the measure (Stice, Fisher & Martinez, 2004). The EDDS was not chosen for use in this thesis as no previous studies with athletes had employed it as a measure of eating psychopathology.

The SCOFF questionnaire (SCOFF; Morgan, Reid & Lacey, 1999)

The final measure reviewed was a brief screening measure that was primarily developed to assist in the identification of eating disorders in primary care (Morgan et al., 1999). The measure is made up of five questions that require a “yes” or “no” answer. An example of one of the questions is: “Do you worry you have lost control over how much you eat?” Answering “yes” to two or more of the five questions is deemed to indicate the presence of a potential eating disorder (Morgan et al., 1999). The measure has demonstrated good discriminant validity in identifying those with eating disorders (Morgan et al., 1999) and good convergent validity with the EDE-Q (Mond et al., 2008). The main advantage of the SCOFF is the ease with which it is administered and scored, however it does not provide sufficient information across the eating disorder spectrum to be suitable for use within this thesis.

Athlete specific measures of eating psychopathology

A variety of other measures have been created specifically for detecting potential eating psychopathology within the athlete population. For example, the Female Athlete Screening Tool (FAST; McNulty, Adams, Anderson & Affenito, 2001) was developed specifically for female athletes, in recognition that athlete eating attitude and exercise behaviours are different to those of the general population. As a consequence, non-athlete measures of eating psychopathology may overestimate eating disorders in athletes, due to misinterpretation of their rigorous exercise programs and rigid eating patterns, which are primarily performance driven (McNulty et al., 2001). The measure is scored on a 4-point Likert scale, from 1 (strongly agree) to 4 (strongly disagree).
An example question is “I think that being thin is associated with winning”. The convergent validity, and internal consistency of the FAST have been found to be acceptable (McNulty et al., 2001), however the measure has not been frequently used within the athletic population, and is not designed for use with male athletes.

Alternative measures that have been recently developed include the Brief Eating Disorders in Athletes Questionnaire (BEDA-Q; Martinsen, Holme, Pensgaard, Torstveit & Sundgot-Borgen, 2014), which is based on the EDI-2, and the Weight Pressures in Sport Scale for Females (WPS-F; Reel, Petrie, Soohoo & Anderson, 2013) and Males (WPS-M; Galli, Reel, Petrie, Greenleaf & Carter, 2011). These measures have only been validated in relatively small and heterogeneous athlete samples, hence were not yet deemed sufficiently robust for use within the studies in this thesis (Martinsen et al., 2014; Galli et al., 2011; Reel et al., 2013).

Summary: Measures of eating psychopathology

There are a large number of measures that have been developed to assess eating psychopathology, some of which have been particularly designed for use with athlete samples. However, these athlete specific measures have yet to be widely used within the field; hence it would be difficult to draw comparisons with other clinical and non-clinical groups. The EDE-Q was chosen for use as a measure of eating psychopathology as it has been widely used within the eating disorders literature, with both clinical, (e.g. Aardoom, Dingemans, Slof Op’t Landt & Van Furth; 2012; Allen, Fursland, Watson & Byrne, 2011; Mond et al., 2008), community (e.g., Hay et al., 2012; Mond, Hay, Rodgers & Beumont, 2004; Mond, Hay; Rodgers & Owen, 2006), and athlete samples (e.g., Hulley, Currie, Njenga & Hill, 2007; Hulley & Hill, 2001; Shanmugam, Jowett & Meyer, 2012; 2013; 2014). The EDE-Q offers a comprehensive assessment of both eating attitudes and behaviours. The EDE-Q is widely used both within research and clinical settings; hence the findings from this study will be comparable to other studies and contexts.

2.5.3 Measures of exercise attitudes and beliefs

As outlined in the introduction, there are a number of inconsistencies within the literature in terms of the terminology and definitions used to describe exercise within the eating disorders. As a consequence, there are a large number of measures that have been proposed and used depending on the theoretical perspective that is adopted with regards to the role of exercise in the eating disorders. The following section provides a description and a critique of the measures available, and a justification for the measure chosen for use within this thesis. This research explores the multidimensional model of exercise within the eating disorders (Meyer et al., 2011). The model incorporates cognitive-behavioural motivations for exercise, such as compulsivity and affect regulation, in addition to weight and shape motivations (Meyer et al., 2011). As such, the
Compulsive Exercise Test was deemed the most appropriate choice of exercise measure for use within this thesis.

The Compulsive Exercise Test (Taranis, Touyz & Meyer, 2011; Appendix I)

The Compulsive Exercise Test is a new 24-item self-report measure based on the multidimensional model of compulsive exercise, designed for use in the eating disorders domain. It has five subscales: (a) Avoidance and Rule Driven Behaviour, (b) Weight Control Exercise, (c) Mood Improvement (d) Lack of Exercise Enjoyment, and (e) Exercise Rigidity. An example item is “If I cannot exercise, I feel anxious.” Responses are scored on a 6-point scale anchored from 0 (never true) to 5 (always true); intermediate response points are 1 (rarely true), 2 (sometimes true), 3 (often true), and 4 (usually true). Higher scores indicate a greater degree of compulsive exercise. The global score is the sum of the means of the five individual subscales. The Compulsive Exercise Test has shown good internal consistency for the individual subscales (α ≥ 0.71) and global score (α ≥ 0.85) among both adult and adolescent samples (Goodwin et al., 2011; Taranis et al., 2011). However, the validity of the multidimensional model of exercise within the eating disorders has yet to be verified with an athlete population. One focus of this thesis is to assess the suitability of the Compulsive Exercise Test for use with athlete samples.

Other theories of exercise within the eating disorders have conceptualised exercise as “addictive”, focusing primarily on the notion of withdrawal when exercise is prevented and the volume of exercise completed (Davis; 1997; Davis & Claridge, 1998; Davies & Woodside, 2002; Dishman, 1985). This has resulted in a variety of measures that have attempted to capture exercise as an addictive behaviour, including the Obligatory Exercise Questionnaire (Pasman & Thompson, 1988); the Commitment to Exercise Scale (Davis, Brewer & Ratusny, 1993); the Exercise Dependence Scale (Hausenblas & Downs, 2002) and the Exercise Orientation Questionnaire (Yates, Edman, Crago, Crowell & Zimmerman, 1999).

Obligatory Exercise Questionnaire (OEQ; Pasman & Thompson, 1988)

The Obligatory Exercise Questionnaire (OEQ) is a 21-item questionnaire based on Blumenthal and colleagues’ Obligatory Running Questionnaire (Blumenthal, O’Toole & Chang, 1984). The OEQ is scored on a 4-point Likert scale from 1 (never) to 4 (always), with higher scores indicative of greater obligatory exercise. An example item is as follows: “When I miss a scheduled exercise schedule I may feel tense, irritable or depressed”. The measure has been shown to have good internal reliability (Pasman & Thompson, 1988; Coen & Ogles, 1993), and has been linked with eating psychopathology among athletes (e.g., Gapin & Petruzzello, 2011) and non-athletes (Thome & Espelage, 2007). However, it is now widely accepted that the OEQ only evaluates certain aspects of exercise dependence, and thus fails to provide an overall assessment of the construct (Hausenblas & Symon Downs, 2002).
Commitment to Exercise Scale (CES; Davis, Brewer & Ratusny, 1993)

The Commitment to Exercise Scale (CES) is a short measure, made up of just 8 items, and is therefore quick and easy to administer. It is designed to assess a pathological commitment to exercise, and has been used frequently within eating disorder research. (Lipsey, Barton, Hulley & Hill, 2006; McLaren, Gauvin & White, 2001; Mond, Hay, Rodgers, Owen & Beumont, 2004b). Higher scores are indicative of more pathological behaviour and beliefs towards exercise. The original measure was scored on a continuum line between two opposing adjectives (Davis et al., 1993). However, this has been recently revised to score on a 4-point Likert scale, and has since demonstrated acceptable internal reliability (Thome & Espelage, 2007). An example item is “Does it upset you, if, for one reason or another, you are unable to exercise?” The CES has been found to correlate with eating psychopathology among athletes (de Sousa Fortes, Neves, Filgueiras, Almeida & Ferreira, 2013). A drawback of the measure is the lack of defined cut-off score to indicate pathological exercising among participants. In addition, the measure does not take into account the role of exercise in affect regulation.

Exercise Dependence Scale (EDS; Hausenblas & Symons-Downs, 2002b)

The Exercise Dependence Scale (EDS) was developed in response to a perceived lack of ‘complete’ measure of exercise dependence that could assess all aspects of the exercise dependence construct among exercisers (Hausenblas & Symons-Downs, 2002b). In addition, it aimed to discriminate between those at risk, symptomatic and asymptomatic for exercise dependence. Exercise dependence was operationalised according to the DSM-IV criteria for substance dependence (APA, 1994). The original measure had 28 items, which was reduced to 21 in a later revision (Symons-Downs, Hausenblas & Nigg, 2004). It is measured on a 6-point Likert scale from 1 (never) to 6 (always), with higher scores indicative of greater exercise dependence. An example item is as follows: “I organise my life around exercise”. The measure has been found to be suitably valid and reliable (Symons-Downs et al., 2004) and is closely linked to levels of eating psychopathology (Cook & Hausenblas, 2008), but the EDS has yet to be used extensively with athletes.

The Exercise Orientation Questionnaire (EOQ; Yates, Edman, Crago, Crowell & Zimmerman, 1999)

The final exercise measure to be considered for use in this thesis was the Exercise Orientation Questionnaire (EOQ; Yates et al., 1999) The EOQ was partly developed in response to a lack of an exercise measure that could identify athletes at risk of an eating disorder (Yates et al., 1999). The measure is made up of 27 items, which are scored on a Likert scale of 1 (strongly disagree) to 5 (strongly agree); e.g. “I try to exercise instead of snacking”. The initial validation studies of the EOQ were conducted with only small samples of athletes, although these did indicate
adequate reliability and discriminant validity of the EOQ, (Yates et al., 1999; Yates, Edman, Crago & Crowell, 2001). However, the measure has not been widely adopted in investigations exploring eating psychopathology among athletes.

Summary: Measures of exercise attitudes and behaviours

There are a wide variety of measures within the literature that have been developed to explore the role of exercise both within the context of the eating disorders, and more broadly. This perhaps reflects the different theoretical perspectives and definitions that are ascribed to exercise (Meyer, Taranis & Touyz, 2008). As such, there is an absence of a comprehensive measure of the multidimensional nature of exercise within the eating disorders that has been identified as relevant and appropriate for athletes. The Compulsive Exercise Test (Taranis et al., 2011) takes into account the multidimensional nature of exercise in the eating disorders, with a focus on the cognitive-behavioural motivations for exercise. This is in contrast to the exercise addiction and exercise dependence perspective that has been the focus of the field for some time, despite a lack of supporting evidence (Mond, Myers, Crosby, Hay & Mitchell, 2008; Taranis et al., 2011). As such, the CET was determined as the most appropriate measure with which to assess athlete exercise attitudes; although it was acknowledged that it would first need to be appropriately validated with an athlete sample. As such, study 1 explored the validity of the CET for use within an athlete population. Subsequently, this thesis aimed to explore the links between exercise attitudes and eating psychopathology in the athlete population, and to explore whether such a measure might be suitable for identifying those athletes with elevated levels of eating psychopathology i.e. as a potential screening tool for use within the athlete population. Studies 2 and 3 explore the links between exercise attitudes and eating psychopathology in more depth, and assess the validity of the CET as a potentially suitable screening measure for use within the sporting context.

2.5.4 Measures of emotion regulation

Emotion regulation deficits have been consistently associated with elevated levels of eating psychopathology (e.g., Gilboa-Schechtman, Avnon, Zueery & Jeczmien, 2006; Harrison, Sullivan, Tchanturia & Treasure, 2010; Lavender & Anderson, 2010; Sim & Zeman, 2006; Svaldi, Grippenstroh, Tuschen-Caffier & Ehring, 2012). As such a number of different measures have been developed and utilised within the eating disorders literature. Several measures are also utilised within the sport and exercise psychology literature, as emotion regulation has been identified as having an important impact on sporting performance (e.g., Lane, Beedie, Jones, Uphill & Devonport, 2012; Vallerand & Blanchard, 2000). However, the focus of these measures tends to be around the psychological skills required for appropriate emotion regulation, as opposed to the use of maladaptive strategies and their potential consequences on both athlete health and
performance (Lane et al., 2012). A brief overview of some of the measures that were considered for use in this thesis is presented.

**Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004; Appendix F)**

The measure that was chosen for use in this thesis was the Difficulties in Emotion Regulation Scale (DERS). The DERS was developed to comprehensively assess the multidimensional nature of emotion regulation (Gratz & Roemer, 2004). It is a 36-item measure that has six subscales: (a) Nonacceptance of emotional responses; (b) Difficulties in engaging in goal directed behaviour; (c) Impulse control difficulties; (d) Lack of emotional awareness; (e) Limited access to emotion regulation strategies; and (f) Lack of emotional clarity. An example item is: “*When I’m upset, I feel guilty for feeling that way.*” The measure is scored on a 5-point Likert scale, from 1 (almost never, 0-10%) to 5 (almost always, 91-100%). Higher scores on the measure indicate greater difficulties with emotion regulation. The DERS has been widely used among eating disordered populations (e.g., Brockmeyer et al., 2014; Harrison et al., 2010; Lavender et al., 2014; Svaldi et al., 2012) and also with non-clinical samples (Cooper, O’Shea, Atkinson & Wade, 2014; Lavender & Anderson, 2010). The measure has been found to have good reliability and validity (Gratz & Roemer, 2004; Weinberg & Klonsky, 2009). The measure has yet to be used with athletes; however it was deemed appropriate for use in this thesis given the extent to which it has been validated in eating disorder research, and in recognition of the potential for comparison with other relevant studies.

**Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2001)**

The original CERQ is a 36-item questionnaire that was developed to assess cognitive responses and strategies after a threatening or stressful event (Garnefski et al., 2001). More recently, a shorter, revised version of the CERQ has been developed (Garnefski & Kraaij, 2006), which has just 18 items. There are nine, two item subscales, which include: (a) Self-blame; (b) Other-blame; (c) Rumination; (d) Catastrophizing; (e) Positive refocusing; (f) Planning; (g) Positive reappraisal; (h) Putting into perspective and (i) Acceptance. Participants respond on a 5-point Likert scale from 1 (almost never) to 5 (almost always). Scores for each subscale are summed, and higher scores are indicative of greater use of the specific cognitive strategy (Garnefski & Kraaij, 2006). The short version of the measure has demonstrated good psychometric properties, with high internal consistency and divergent validity with measures of anxiety and depression (Garnefski & Kraaij, 2006). However, the focus of the measure relates to the cognitive strategies employed, and the emotional reaction to significant and stressful events. This is in contrast to the main focus of this thesis, which is primarily concerned with the ‘every-day’ emotion regulation strategies that are employed by athletes and non-athletes.
The Distress Tolerance Scale (DTS; Corstorphine, Mountford, Tomlinson, Waller & Meyer; 2007)

The Distress Tolerance Scale (DTS) was developed specifically for use within the eating disorders, to identify the nature of difficulties in emotion regulation in this group, and to assess the ways in which eating disorder patients cope with their emotions (Corstorphine et al., 2007). The measure is made up of 14 items, which are scored on a 5-point Likert scale from 1 (never) to 5 (all the time). It is composed of three subscales, including (a) “Avoidance of affect”, (b) “Accepting and managing emotion” and (c) “Anticipate and distract”. The measure asks participants to think of an occasion where they had been distressed or upset, prior to answering the questions. An example question is: “I don’t let myself think about things that would depress me”. The three-factor structure of the measure was initially developed with a clinical eating disorder sample (Corstorphine et al., 2007), however more recent studies have suggested that a four factor structure may be more appropriate for those with current eating disorders (e.g., Raykos, Byrne & Watson, 2009). The DTS was not chosen for use within this thesis as it has primarily been used within the clinical eating disorder context, and the factor structure has yet to be validated within non-clinical groups.

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003)

The ERQ is a short, 10-item measure of emotion regulation that aims to differentiate between the use of reappraisal and suppression strategies of emotion regulation (Gross & John, 2003). It is scored on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). An example item is “I keep my emotions to myself”. Four items measure suppression strategies, while the remaining six items measure reappraisal strategies. The internal consistency of the measure has been described as satisfactory, and the factor structure consistent (Gross & John, 2003). However, one drawback of the measure is that it only assesses two strategies of emotion regulation, and therefore it does not provide a complete assessment of emotion regulation strategies. The validity of the measure has also been considered in athlete groups (Uphill, Lane, & Jones, 2012). The factor structure of the measure was found to be acceptable, although test-re-test reliability scores were low, suggesting that scores may be affected by contextual factors rather than measuring stable traits (Uphill et al., 2012). The instability of the items suggested that this measure may not be suitable for use with athlete groups; hence it was not employed within this thesis.

Summary: Measures of emotion regulation

The review of the emotion regulation measures revealed that there are few multidimensional measures of emotion regulation that are suitable for use with athlete samples. The Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004) was chosen for use in this thesis as this is the most commonly used measure within the eating disorders field. In addition, it is
a reliable, valid and multidimensional measure that will allow a broad investigation of emotion regulation difficulties among both athletes and non-athletes.

2.6 General procedure for quantitative studies

All participants in the quantitative studies were made aware that their participation was voluntary and that they were able to withdraw at any time. All of the participants were provided with information about the study, including the purpose, what was involved, and how long it would take. They were informed as to how their data would be stored and used. Participants were provided with information on who to contact if they had any further questions about the research or if they had any concerns about the way in which the research was conducted. Participants were asked to indicate their consent to participate, prior to taking part in the study. Participants were able to complete the study online or by hand. Regardless of the domain in which they took part in the study, the information they received about the study was the same, and they were able to contact the researcher in both cases if they had further queries about the study.

2.7 Quantitative Data analysis

2.7.1 Preliminary data cleaning and analysis

A variety of quantitative data analytical techniques were employed within this thesis. Prior to conducting any analyses, the data were assessed for outliers, normality and missing data. Extreme outliers were identified using box plots and standardised z scores. The values were assessed for plausibility and the original data was consulted to rule out potential data entry errors. Missing data was replaced with the means for the individual (for each subscale) rather than the sample mean, in order to avoid reducing the sample variance (Hill & Lewicki, 2005). Normality of the data was assessed through histograms and Kolmogorov Smirnov statistics. Where data were not parametrically distributed, the bootstrapping technique was applied (in the confirmatory factor analysis) or non-parametric equivalent statistical tests were employed.

2.7.2 Subsequent data analyses

Due to the large sample sizes included in most of the quantitative studies included in this thesis, and the multiple comparisons that were conducted, a $p$ value of <.01 was adopted for statistical tests throughout the thesis to reduce the risk of Type I errors (Field, 2005). This ensured that the findings represented true differences between the samples. The quantitative data analysis was conducted in either IBM SPSS 21.0, or IBM AMOS 20. The statistical tests employed in this thesis in addition to descriptive statistics include: Confirmatory and exploratory factor analysis; multiple regression; Mann Whitney U tests; t-tests; two-tailed Spearman’s Rho correlations; receiver operating curve analysis; chi-square tests of independence and mediation analysis,
including Sobel tests for partial mediation (Sobel, 1982). Baron and Kenny’s (1986) mediation method was employed in this study, as a commonly utilised analytical method within the eating disorders and exercise literature (e.g., Cook & Hausenblas, 2008; Dingemans, Spinhoven & Van Furth, 2007; Krentz & Warschburger, 2011; Watson, Raykos, Street, Fursland & Nathan, 2011).

2.8 Qualitative methods

Guidance for the qualitative studies within this thesis was sought from an experienced qualitative researcher (Dr Hilary McDermott). A qualitative approach was deemed appropriate in tackling research questions where limited previous literature existed and thereby the nature of the research was exploratory. In addition, the qualitative approach offered an alternative perspective, by focusing on individual experiences, as opposed to risk factor research with large groups, which has been criticised for dominating much of the literature in this area (Papathomas & Lavallee, 2012). In particular, a qualitative approach was used to explore coach experiences of identifying eating disorders among athletes and their approaches in managing and working with athletes who are affected by eating psychopathology. Qualitative methods were also employed to explore experiences of athletes currently receiving treatment for an eating problem. In particular, their experiences of disclosing an eating disorder, and their treatment experiences and expectations were explored. This section therefore explains why a qualitative approach was taken for these studies. A description of the procedure and the analytical approach is also provided.

2.8.1 Justification of the research method

Qualitative methods are commonly employed to answer research questions that focus on the ‘what’, ‘how’, or ‘why’, as opposed to questions of ‘how many’ or ‘how much’ (Willig, 2013). Qualitative methods can therefore be used to identify areas for further exploration, including constructs that may have been previously overlooked in quantitative research (Kelle, 2008). In addition, qualitative approaches can also be used to explore expressive information such as the beliefs, values, feelings and motivations that underlie behaviour, which are not as easily conveyed in quantitative data (Smith, 2008).

Indeed, the current focus of the literature on the prevalence of eating psychopathology among athletes and on identifying athletes who are most at risk, favours the group perspective over the individual experience (Papathomas & Lavallee, 2012). Qualitative approaches emphasise the individual experience, and place equal value on the experiences of athletes from traditionally ‘low-risk’ and ‘high risk’ sports. Instead, it is acknowledged that both perspectives offer an important insight into the experience of eating psychopathology in the sporting context (Papathomas & Lavallee, 2012). In contrast, quantitative research in the literature has focused primarily on ‘high-risk’ groups, with a view to developing specific prevention and intervention programmes for these
athletes (Striegel-Moore & Bulik, 2007). However, it is also important to recognise the value of understanding the experiential element of eating disorders in sport, and to explore this from the perspective of a variety of stakeholders, in addition to athletes themselves (Papathomas & Lavallee, 2012).

Indeed, over the past decade there has been an increase in the amount of qualitative and experiential research that has been conducted in the area of eating disorders in sport. The majority of this research has been conducted from the perspective of the athlete (e.g. Arthur-Cameselle & Baltzell, 2012; Jones et al., 2005; Papathomas & Lavallee, 2006; 2010; 2012a; 2013). In addition, autoethnographic accounts provide a unique insight into the experiences of weight and body shape pressures that are experienced within the sporting context (e.g., McMahon & Dinan-Thompson, 2008; McMahon & Penney, 2012; Stone, 2009). However, qualitative research in the area of eating psychopathology in sport is still limited, with many questions still to be explored. For example, previous research has tended to focus on the development of eating psychopathology and experiences of living with an eating disorder (e.g., Jones et al., 2005; McMahon & Dinan-Thompson, 2008; McMahon & Penney, 2012), but is yet to explore disclosure or treatment seeking experiences. In addition, limited qualitative research has been conducted with stakeholders other than the athletes themselves (Nowicka et al., 2013).

Qualitative research does not aim to prove or disprove a hypothesis, or to generalise results beyond the sample with which it was conducted, but it can offer a unique perspective on a topic that can open up new avenues for exploration. It can also serve to facilitate a greater level of understanding of phenomena among researchers and clinicians alike.

2.8.2 Philosophical position

In qualitative research it is necessary for the researcher to recognise their own potential influences on both the data collection and data analysis processes (Willig, 2013). This perspective on the researcher’s influence will vary according to the philosophical position adopted (Willig, 2013), and will also influence the methods chosen and analytical strategy used (Hignett, 2005). In this thesis, a critical realist perspective was adopted. Critical realism is a philosophical approach that was developed in response to the perceived limitations of positivism and relativism (Bhaskar, 1989). This approach supports the position that experiences can be explored through speech, hence interviews are commonly utilised to gain an insight into participant experiences. However, critical realism recognises that representations of reality are affected by language and culture; hence the impact of sociocultural factors is also acknowledged and explored. In addition, the knowledge produced by ordinary people is considered valuable and of equal importance to that of experts (Pilgrim & Rogers, 2002).

As a current international track and field athlete, it was also important to acknowledge the potential influence that my own background, knowledge and perceptions of the research topic
could have on the data collection and analysis process. It was deemed that being an ‘insider’ could offer many advantages, primarily in terms of facilitating a rapport with the participants through shared knowledge of the sporting context (Douglas & Carless, 2012), which would have been more challenging to achieve by researchers from outside of the unique sporting environment. Previous research has suggested that participants may be more willing to disclose their experiences with ‘insiders’, due to assumed mutual understanding and knowledge (Corbin Dwyer & Buckle, 2009). There are some potential disadvantages with insider research that it is important to acknowledge. My own experiences are likely to shape the research questions developed, the line of questioning taken in the interviews and perspectives on the data collected. This was acknowledged and reflected upon in the reflective diary that was maintained throughout the qualitative studies (Appendix J; Appendix K). In addition, the interview schedule was developed in consultation with experts from within the field. Finally, the outcomes of the analysis were regularly discussed and reflected upon with the other members of research team, to ensure that the analysis reflected the data as closely as possible.

2.8.3 Qualitative data collection: Semi structured interviews

Semi-structured interviews were chosen as the method of data collection for the qualitative studies within this thesis. This method was considered to be concordant with the philosophical position of critical realism, which accepts that experiences can be explored through participant accounts (Bhaskar, 1989). Semi-structured interviews are loosely structured, with a list of topics (and potential prompts) that the researcher wishes to cover, however the order in which these topics are covered is not predefined. The inclusion of additional questions is encouraged, to explore in-depth the individual participant’s experiences and to probe interesting issues that arise (Smith, 2008). As such, this method can facilitate the discovery of novel areas of enquiry that might otherwise be difficult to discover through structured interviews or questionnaire techniques.

Focus groups were not deemed suitable for the research questions explored within this thesis given the highly sensitive nature of the topic explored, and also the focus on the *individual* experience. Focus groups are particularly useful in exploring consensus and interactions between participants (e.g. Kitzinger, 1994); however with patients and coaches it was deemed more appropriate to explore their experiences at an individual level. Unstructured interviews were also not deemed appropriate for investigating the research questions posed within this thesis. Unstructured interviews are commonly used with narrative, life history and individual case study research (Willig, 2013). As specific research questions about certain elements of athlete and coach experiences were posed, a semi-structured interview schedule was adopted to ensure that the interviews covered these elements, but also retained some flexibility to explore other issues raised within the discussions.
The semi-structured interview schedules that were utilised for the qualitative studies within this thesis are provided in Appendices L and M. Semi-structured interviews offer a flexible research method, as the data can be analysed in numerous ways, depending on the research question and the researcher’s philosophical position (Willig, 2013). Semi-structured interviews are the method of choice for researchers wishing to conduct either thematic analysis or interpretative phenomenological analysis (Smith, 2008). Interviews were conducted either on the phone or face to face. All of the interviews with athletes currently seeking treatment for an eating disorder took place in a therapy room in the service in which they were currently seeking treatment.

2.9 Data Analysis

Thematic analysis (Braun & Clarke, 2006)

Thematic analysis is a flexible and accessible method of analysis that has been comprehensively used within qualitative research in psychology (Braun & Clarke, 2006). It allows the researcher to describe and interpret commonly occurring and important patterns within the data. There are two primary forms of thematic analysis – inductive and deductive. Inductive thematic analysis, which was chosen here, is a ‘bottom up’ approach, whereby themes are closely linked to the data, and not restricted by a pre-defined coding framework. A rich description of the data can therefore be generated, and there is scope for interpretation in relation to contextual and cultural factors (Braun & Clarke, 2006). As such, this method of analysis is concordant with the philosophical position of critical realism.

The process outlined by Braun and Clarke (2006) was utilised as a framework for guiding the analysis in studies 4 and 5. The early stages of thematic analysis require familiarisation with the data, through manual transcription and multiple readings of the transcripts. This process also involves referring back to the reflective diary and notes made during the interview to highlight key features and to guide the initial stages of the analysis. Thematic analysis endorses systematic coding of the text, whereby salient and interesting features of the data are labelled. These codes can then be grouped together to create potential themes (Braun & Clarke, 2006). The themes are repeatedly reviewed to ensure that they accurately reflect the data. Corresponding quotes are then selected from the interviews, which appropriately represent the themes and subthemes. The themes can then be considered in the context of the current literature, and how they compare or contrast to the position of the field.

Thematic analysis is considered as a foundational method for qualitative analysis, from which other skills and methods can be developed (Holloway & Todres, 2003). Unlike the more complex qualitative methods such as grounded theory or discourse analysis, thematic analysis does not require extensive theoretical and technical knowledge, and thus is appropriate for use by
researchers who are new to the methodology (Braun & Clarke, 2006). In addition, thematic analysis does not require a commitment to theory development, which can be an extremely lengthy process (Holloway & Todres, 2003). Instead, thematic analysis aims to search for common themes and patterns that occur across a dataset (as opposed to within an individual case study), and to report and reflect upon these. Studies 4 and 5 represented the first two qualitative studies in this thesis, and thematic analysis was deemed an appropriate method of analysis with which to start.

**Interpretative Phenomenological Analysis (IPA; Smith, 1996)**

Interpretative Phenomenological Analysis (IPA) was the second method of qualitative data analysis employed within this thesis, and was used in studies 6 and 7. IPA is a method that has been gaining in momentum and popularity over the past decade and particularly within health psychology (Chapman & Smith, 2002). There is an increasing recognition of the importance of understanding patient perceptions and the meaning they ascribe to their experiences (Brocki & Wearden, 2006).

The approach is phenomenological in that it is concerned with individual subjective reports, as opposed to objective accounts; it is concerned with how participants make sense of their experiences, as opposed to attempting to produce an objective record of the event itself (Brocki & Wearden, 2006). In addition, IPA recognises and emphasises the role of the researcher in interpreting and facilitating understanding of participant accounts. Smith, Flowers and Larkin (2009) describe a double hermeneutic, whereby the interpretations are bounded by the ability of the participant to describe their experiences, but also by the researcher’s ability to reflect upon and analyse the accounts. As such, IPA was deemed to appropriately convene with the philosophical position of critical realism that was adopted within this thesis.

IPA is closely aligned with the methods of semi-structured interviews, as it allows an in-depth analysis of the participant experience, and provides the researcher with flexibility in exploring the participant’s account (Smith et al., 2009). IPA is often used in case studies and with small sample sizes, due to the time-intensive requirements of the analysis, and the focus on the individual experience. However, Smith and Osborn (2008) state that there is no ‘right’ sample size, however larger data sets may result in a loss of ‘potentially subtle inflections of meaning’ (Collins & Nicholson, 2002). Sampling in IPA tends to be purposive as it aims to illuminate particular research questions, as opposed to providing representative and generalizable findings (Brocki & Wearden, 2006).

The process of IPA has been fully described and outlined by Smith and Osborn (2008) to help guide researchers through the analysis. The method is not intended to be formulaic or objective, but rather to provide guidance that can be adapted and developed by researchers, depending on the nature of their data (Smith & Osborn, 2008). Similar to thematic analysis, the first stage of the analysis requires familiarisation with the data, although researchers can achieve
this familiarisation in different ways (Brocki & Wearden, 2006). For example, Smith & Osborn (2008) advocate identifying themes and connections in the text, whilst others utilise the theoretical models of the research topic as a starting point (e.g., Collins & Nicholson, 2002). In contrast to a thematic approach, IPA is done on an individual case by case basis, where the first case is fully analysed before moving onto the next one. Themes identified within each interview are listed and potential connections between the themes can be explored (Smith & Osborn, 2008). The themes identified early on in the analysis serve to facilitate analysis of subsequent transcripts. The analysis should be conducted as an iterative process, and the early transcripts should be reviewed for any new themes that are identified later on in the analysis. The analysis progresses from the descriptive to the interpretive, which can involve a move away from the transcripts and a focus on the notes that the researcher has developed, but the focus remains on how participants make sense of their experiences (Cassidy, Reynolds, Naylor & De Souza, 2011). IPA was therefore determined as an appropriate method of analysis to use when exploring athlete experiences of disclosure and treatment seeking in studies 6 and 7.

Ensuring the validity of qualitative analysis

The notion of validity within qualitative research is an area of some contention (e.g., Creswell & Miller, 2000; Seale, 1999; Sparkes & Smith, 2009; Whittemore, Chase & Mandle, 2001). Establishing validity in qualitative research is a particular challenge, because of the necessity to incorporate rigour and subjectivity, and to demonstrate that the methods adopted were credible. Previous conceptualisations of validity in qualitative research have focused on techniques such as triangulation (using multiple methodologies to answer the same research question), member checking (asking participants to verify the analysis), and quantitatively measuring the level of agreement in the analysis between two researchers (e.g., Creswell & Miller, 2000). The method of establishing validity chosen can depend on the philosophical and epistemological position of the researcher (Sparkes & Smith, 2009; Yardley, 2008). For example, triangulation and a measure of level of agreement methods tend to reflect a positivist or quantitative approach to qualitative inquiry, whereby the generalizability of the findings may be the main concern (Yardley, 2008). However, this is not commonly a main focus of qualitative research; instead, the aim is more usually to report and reflect upon the experiences of a small group of individuals. This thesis utilised three commonly used techniques to ensure that the qualitative studies were conducted rigorously and that the findings are valid. These techniques were also considered to be concordant with the philosophical position adopted.

Independent perspective on analysis

For each of the qualitative studies reported in this thesis (Studies 4, 5, 6, 7), a second experienced qualitative researcher was asked to independently code a sample of the data. The two
researchers then held discussions over the codes and themes that were generated. This process was primarily aimed at stimulating discussion about the generated themes, as opposed to ensuring complete concordance between the two researchers, which is unrealistic to expect given the individual differences between the two researchers, and notably the unique insider’s perspective held by the author (Douglas & Carless, 2012).

Audit trail and reflective diary

A reflective diary and an audit trail of the analysis stages were maintained for the qualitative studies within this thesis (Appendices J, K, N and O). An audit trail maintains a record each of the major steps and decisions that are taken in the analysis, from the initial transcription of the data, through to the final presented manuscript. Audit trails can be referred to and assessed by others who are evaluating the validity of the research and the rigour with which it was conducted. It was helpful to the researcher to look back and evaluate how and why each decision was made. The reflective diary was also maintained during the initial interviewing period to ensure that any interesting thoughts or ideas that occurred to the researcher during the interview itself were recorded and used in the later analysis. The reflective diary also allowed the researcher to reflect on and identify the influence that an insider perspective might have had on the data collection process.

Critical friends

Throughout the data analysis, other members of the research team were regularly consulted to act as ‘critical friends’ (Sparkes & Smith, 2002). They were encouraged to challenge the researcher’s initial interpretations and stimulate thinking and reflection on alternative perspectives and explanations.

2.10 Conclusions

This chapter has presented an overview of the commonly used methods within the field of eating disorders and sport. The current focus of the literature has been to explore the concept of eating psychopathology in athletes from a primarily quantitative perspective, through the use of self-report questionnaires. To address the research questions proposed within this thesis, it was deemed appropriate to use both quantitative and qualitative methods. Employing both quantitative and qualitative methods was considered to be in line with the researcher’s philosophical position of critical realism. Clear strategies have been outlined to ensure that both types of methodology were conducted rigorously and to ensure that the findings presented in subsequent studies are valid.
Part 2: What is the link between exercise attitudes and eating psychopathology in athletes, and how can we measure it?

Part two of this thesis explored the construct of compulsive exercise within an athlete sample. Study 1 aimed to explore the validity of the Compulsive Exercise Test in measuring compulsive exercise among athletes, and to establish whether associations exist between compulsive exercise and eating psychopathology for this group. Study 2 aimed to assess whether the Compulsive Exercise Test could successfully identify athletes with elevated levels of eating psychopathology, and to identify an appropriate cut-off score on the test to distinguish these athletes. Study 3 aimed to explore one potential mechanism by which compulsive exercise is associated with elevated levels of eating psychopathology. Compulsive exercise was proposed as a maladaptive strategy for dealing with negative affect, and thereby was investigated as a potential mediator between difficulties with emotion regulation and eating psychopathology for athlete and non-athletes.
Chapter 3  Use of the Compulsive Exercise Test with athletes:
Norms and links with eating psychopathology

3.1 Introduction

This chapter describes the first quantitative study of this thesis. Part one of this thesis provided an overview of how exercise attitudes can trigger and perpetuate eating psychopathology, and introduced the multidimensional model of compulsive exercise (Meyer et al., 2011). One of the broad aims of this thesis is to assess the validity of this model of exercise among an athlete population, since athlete exercise behaviours and attitudes are somewhat different to those of the general population. Previous conceptualisations of exercise within the eating disorders have focused on the quantity of exercise completed, which is likely to bear little relevance to the athletic population (Davis, 1997; 2000). Therefore this study aims to explore a possible link between the cognitive-behavioural dimensions of exercise with eating psychopathology among athletes.

This first study explores the validity of the five-factor Compulsive Exercise Test in assessing exercise attitudes and behaviours among athletes. In addition, a possible link between compulsive exercise and eating psychopathology is explored in this group. The present study allows us to establish whether the relationship between compulsive exercise and eating psychopathology that has been found in the general population, also exists within the athletic population. The results of the study aim to determine whether the original Compulsive Exercise Test is relevant for use within an athlete group.
3.2 Study 1: Use of the Compulsive Exercise Test with Athletes: Norms and links with eating psychopathology

The following study has been published in the Journal of Applied Sport Psychology. Small changes have been made to ensure the format is in line with the rest of the thesis.


**Abstract**

**Objective:** This study assessed the 5 factor structure of the Compulsive Exercise Test and explored the relationship between compulsive exercise and eating psychopathology in athletes.  

**Method:** Confirmatory and exploratory factor analyses of the Compulsive Exercise Test were conducted with 689 competitive athletes (aged 18 to 35 years). Convergent validity with the Eating Disorder Examination Questionnaire was explored. **Results:** The 5 factor structure showed a poor fit; an alternative 3 factor structure is proposed. Exercising for weight control and to avoid a negative mood were strongly associated with eating psychopathology. **Conclusions:** Compulsive exercise and eating psychopathology are closely associated in athletes. The Compulsive Exercise Test may require modifications for use with an athlete sample.

**Introduction**

Exercise has been consistently identified as an important factor in both the development and maintenance of eating psychopathology (Davis et al., 1997; Davis, Katzman & Kirsh, 1999). Many patients report being involved in sport prior to dieting and levels of activity have been found to significantly increase prior to onset and during the acute phase of an eating disorder (Davis, Kennedy, Ralevski & Dionne, 1994). Exercise among eating disordered patients can also have a negative impact on treatment outcome (Dalle Grave, Calugi & Marchesini, 2008), with exercising patients more likely to relapse (Carter, Blackmore, Sutandar-Pincock & Woodside, 2004) and require longer hospitalization (Solenberger, 2001). Further evidence for the association between exercise and eating psychopathology comes from the significantly increased prevalence of eating psychopathology among athletes (Byrne & McLean, 2002; Torstveit, Rosenvinge & Sundgot-Borgen, 2008). These studies, involving a two-stage process of screening and subsequent clinical interview, have found that up to 20% of female and 8% of male elite athletes meet the criteria for an eating disorder (Sundgot-Borgen & Torstveit, 2004). Athletes competing in lean sports
(endurance, aesthetic, and weight dependent sports) are considered most at risk (Smolak, Murnen, & Ruble, 2000; Torstveit et al., 2008). The incidence of eating disorders among athletes competing at sub-elite levels is difficult to establish due to differences in the methods used to define this group of athletes. There is, however, evidence to suggest a protective effect of competing in sport at a non-elite level, with lower levels of eating psychopathology indicated in comparison to elite athletes (Byrne & McLean, 2001; Picard, 1999; Smolak et al. 2000).

Identifying athletes who are vulnerable to developing an eating disorder remains a challenge for clinicians and sports professionals alike (Thompson & Sherman, 2010). This is due to several factors, such as sport body stereotypes, which can foster expectations for athletes to be a particular size and shape. For example, coaches may expect distance runners and gymnasts to be slim and thus may experience difficulties in noticing weight loss among these athletes (Thompson & Sherman, 1999). Similarly, eating disorder symptoms such as amenorrhea may be perceived as normal among athletes (Sherman, Thompson, Dehass & Wilfert, 2005), and therefore not prompt early investigation into a potential eating problem. Moreover, coaches and sports professionals also report lacking in confidence and knowledge when identifying the early signs and symptoms of eating problems among athletes (Vaughan, King, & Cottrell, 2004). Lastly, a fundamental issue lies with differentiating between athletes engaging in unhealthy exercise that could indicate an eating disorder, and those who are merely committed to training (Thompson & Sherman, 2010). Some possible reasons for this will be considered, alongside an exploration of an alternative model for exercise in the eating disorders, and its potential to assist in distinguishing athletes at risk.

A primary difficulty in identifying athletes engaging in unhealthy exercise behaviours lies with the traditional view that the functional utility of exercise within the eating disorders is primarily for calorie burning, weight and shape control (Fairburn, Cooper & Shafran, 2003). Such conceptualizations prompted investigations into the frequency and duration of exercise that might engender an increased risk for eating disorders (Davis, 1997; 2000). However, there has been little agreement about how much exercise is excessive (Davis & Kaptein, 2006; Shroff et al., 2006), and exercise quantity has not been found to be related to eating psychopathology (Mond, Myers, Crosby, Hay & Mitchell, 2008; Taranis, Touyz & Meyer, 2011). Moreover, a definition of problematic exercise that focuses on the duration and frequency of exercise may bear little relevance for athletes. In order to successfully identify unhealthy exercising attitudes and behaviours among athletes, it is necessary to consider an alternative definition of exercise that incorporates cognitive behavioural maintenance factors of exercise, in addition to weight control.

One such multidimensional model of compulsive exercise within the eating disorders has recently been proposed (Meyer, Taranis, Goodwin & Haycraft, 2011; Taranis et al., 2011). In addition to exercising for weight control, the model also incorporates additional cognitive behavioural maintenance components of compulsive exercise, such as exercising for positive and
negative affect regulation, exercise rigidity and compulsivity to exercise despite a lack of enjoyment. The evidence for each of these components will be considered in more depth.

First, the inability to cope with adverse mood has been identified as an important maintenance factor for eating disorders, with dysfunctional mood regulatory behaviours often employed to normalize negative mood states (Fairburn et al., 2003). Compulsive exercise has been proposed as one of these mood regulation strategies (Meyer et al., 2011), maintained primarily by negative reinforcement mechanisms (Bratland-Sanda et al., 2010b; De Young & Anderson, 2010; Penas-Lledo, Vaz Leal & Waller, 2002). Exercising to control weight, shape, and appearance have previously been identified as primary motivations for exercise in the eating disorders (Dalle Grave et al., 2008, Davis et al., 1994); however negative affect regulation has recently been cited as an important reason for exercise by eating disordered patients (Bratland-Sanda et al., 2010a). It is plausible to suggest that affect regulation may be perceived as a more socially acceptable reason for exercise, however there is evidence to suggest a role of exercising for negative affect regulation in the etiology and maintenance of eating disorders (Holtkamp, Hebebrand & Herpertz-Dahlmann, 2004; Thome & Espelage, 2004). Specifically, reductions in eating psychopathology in patients have been found to correlate with a reduction in the perceived importance of exercising to regulate negative affect, but not with weight control exercise (Bratland-Sanda et al., 2010b). Furthermore, negative affect but not exercising for weight control, was found to be a significant predictor of exercise dependence in both patients and controls (Bratland-Sanda et al., 2011).

Second, exercise rigidity is an important component of compulsive exercise (Yates, 1991) and is a strong predictor of eating psychopathology (Boyd, Abraham & Luscombe, 2007). Rigidity is closely linked with dysfunctional perfectionism (Riley & Shafran, 2005), which is associated with higher levels of compulsive exercise in both non-clinical and clinical groups (Shroff et al., 2006; Taranis & Meyer, 2010). Exercise rigidity can manifest as an inability to reduce exercise routines, experiencing significant distress when exercise is interrupted, or exercising despite malnourishment, injury, or illness (Bamber, Cockerill, Rodgers & Carroll, 2003; Boyd et al., 2007). Rigidity is also an important component of obsessive compulsive personality disorder, which is closely associated with eating disorders (Halmi, 2005). It has been suggested that repetitive exercise behaviour may have an anxiolytic effect (Holtkamp et al., 2004), and is thus closely linked to the compulsive facet of the model.

The compulsivity component of the proposed multidimensional model (Meyer et al., 2011) is underpinned by findings that compulsive exercise has an anxiety-reducing function, analogous to the utility of compulsive behaviours observed among patients with obsessive-compulsive disorder (Davis & Kaptein, 2006). Moreover, compulsively exercising patients score very high on measures of compulsivity (Davis & Claridge, 1998). Feelings of intense guilt when exercise is missed or postponed have also been commonly reported among compulsive exercisers (Mond et al., 2008), serving to maintain driven and rigid exercise routines. In addition, these pathological
attitudes towards exercise have been found to mediate the relationship between exercise and eating psychopathology (Cook & Hausenblas, 2008).

The proposed multidimensional model of compulsive exercise (Meyer et al., 2011) may be of particular use in detecting unhealthy attitudes and behaviours towards exercise in an athletic population, where distinguishing such exercise has been identified as a particular challenge (Thompson & Sherman, 2010). Using an exercise based measure to assess eating psychopathology has been previously conducted among exercisers (Davis, Brewer & Ratusny, 1993; Yates, Edman, Crago & Crowell, 2001); however exercise in athletes has not been measured in a multifaceted way that fits with the eating disorder conceptualization. It is reasonable to extend such an approach to the athletic population, given the high prevalence rates of eating psychopathology within this group. An exercise measure may be more willingly received by athletes than an explicit eating disorder measure, as evidence has suggested that athletes may distort their responses on eating measures (Sundgot-Borgen, 1993), perhaps due to fear of being stopped from training, losing their sponsorship funding or school scholarship (Yates et al., 2001). It is acknowledged that an exercise measure may lack the specificity of an eating measure; however, assessing and subsequently addressing unhealthy exercise behaviours and attitudes may facilitate prevention of eating disorders in athletes.

The Compulsive Exercise Test was developed in accordance with the outlined multidimensional model of compulsive exercise, (Taranis et al., 2011). Factor analysis revealed five factors explaining 64% of the variance in eating psychopathology. These factors encapsulate the model components of exercising for mood regulation, weight control exercise, compulsivity and exercise rigidity. They were labeled (a) Avoidance and Rule Driven Behaviour, (b) Weight Control Exercise, (c) Mood Improvement, (d) Lack of Exercise Enjoyment, and (e) Exercise Rigidity. The factors have been replicated in male and female adolescents (Goodwin, Haycraft, Taranis & Meyer, 2011), and test scores were found to be strongly associated with eating psychopathology scores (Goodwin et al., 2011; Taranis et al., 2011). The multidimensional model of compulsive exercise, as proposed by Meyer and colleagues (2011), has yet to be assessed in athletes.

In summary, there is a wealth of evidence that supports additional cognitive-behavioural maintenance components of compulsive exercise. Athletes are at a significantly increased risk of eating psychopathology, although difficulties remain in identifying athletes engaging in unhealthy exercise, which can precede the development of an eating disorder. The Compulsive Exercise Test could facilitate the detection of exercise attitudes and behaviours that engender an increased vulnerability to eating disorders among athletes. The primary aim of this study was therefore to evaluate the five factor structure of the Compulsive Exercise Test in a sample of competitive athletes. It is predicted that compulsive exercise will be significantly, positively associated with eating psychopathology.
Method

Participants and procedure

Following ethical clearance granted through the Institutional Ethical Advisory Committee, 702 competitive athletes (n = 258 males), were recruited from sports clubs and teams at British universities. For the purpose of this study, athletes were required to meet specific inclusion criteria to be eligible to take part: to be currently competing in, and training for, a particular sport, and to have been doing so for a minimum of six months. Participants who reported engaging in noncompetitive sport were therefore removed (n = 13), leaving a total of 689 participants. Fifteen participants reported a current or previous eating disorder. The ages of the participants ranged from 18 to 35 years, with a mean of the female participants 21.20 years (SD = 3.46) and 21.21 years (SD = 3.01) for males. The mean BMI for females was 21.30 kg/m$^2$ (SD = 2.44), and 24.49 kg/m$^2$ (SD = 3.25) for the male participants. Sport classifications were made according to the system employed by Torstveit and Sundgot-Borgen (2005) to ensure concordance with other studies within the literature. The sample was relatively evenly split between participants in lean (44%) and nonlean (56%) sports. The vast majority of the lean sport athletes competed in endurance sports, such as distance running & triathlon (88%), with small numbers competing in aesthetic (3%), weight dependent (4%) and antigravitational sports (5%). Similarly, most of the athletes within the nonlean category reported competing in ball sports (91%), with small numbers competing in power sports, such as sprinting (7%) and technical sports such as golf (2%). With regards to competitive level, just under a third of the sample (30%) was classified as elite, reporting that they currently competed at national or international level. A further 33% were classified as sub-elite, competing for their region or university, and 19% reported competing for their club or county. A sizable proportion of competition level data was missing for this sample (19%). Participants completed the Compulsive Exercise Test (Taranis et al., 2011) and the Eating Disorder Examination Questionnaire (Fairburn & Beglin, 2008). When answering questions about their exercise attitudes and behaviours, participants were instructed to consider exercise as any form of physical exercise, whether as part of an instructed exercise schedule or recreational exercise.

Materials

The Compulsive Exercise Test (Taranis et al., 2011)

The Compulsive Exercise Test is a 24-item self-report measure based on the multidimensional model of compulsive exercise, designed for use in the eating disorders domain. It has five subscales: (a) Avoidance and Rule Driven Behaviour, (b) Weight Control Exercise, (c) Mood Improvement (d) Lack of Exercise Enjoyment, and (e) Exercise Rigidity. An example item is “If I cannot exercise, I feel anxious.” Responses are scored on a six-point scale anchored from 0 (never true) to 5 (always true); intermediate response points are 1 (rarely true), 2 (sometimes true),
3 (often true), and 4 (usually true). Higher scores indicate a greater degree of compulsive exercise. The global score is the sum of the means of the five individual subscales. The Compulsive Exercise Test has shown good internal consistency for the individual subscales ($\alpha \geq 0.71$) and global score ($\alpha \geq 0.85$) among both adult and adolescent samples (Goodwin et al., 2011; Taranis et al., 2011).

The Eating Disorder Examination Questionnaire 6.0 (Fairburn & Beglin, 2008)

This is a 28-item self-report measure derived from the Eating Disorder Examination; an investigator based interview schedule considered to be the gold standard in assessing eating disorders. The Eating Disorder Examination Questionnaire has shown high internal consistency ($\alpha = 0.85$) and test-retest reliability, Pearson’s $r = 0.81 - 0.94$ (Luce & Crowther, 1999). It uses a 7-point forced choice rating scheme, exploring eating behaviours and attitudes in the preceding 28 days, anchored by 0 (No days) and 6 (Every day). It has four subscales: (a) Restraint, (b) Eating Concern, (c) Shape Concern, and (d) Weight Concern. An example item is “Have you been deliberately trying to limit the amount of food you eat to influence your shape and weight?” The Global Score is the mean of the four individual subscales. The questionnaire has previously been used with athletes to assess eating psychopathology (Sundgot-Borgen & Torstveit, 2004; Shanmugam, Jowett & Meyer, 2011). Cronbach alpha coefficients in this study were (a) Restraint .78, (b) Eating Concern .82, (c) Shape Concern .92, (d) Weight Concern .85, and (e) Global Score .91.

Data Analysis

The data were assessed for univariate and multivariate normality and screened for outliers. Three multivariate outliers were identified and removed ($d^2 = 88.93; 81.14; 80.65; p1 < 0.00; p2 < 0.00$ in all cases). Six hundred and eighty six cases remained. Mardia’s normalized estimate of multivariate kurtosis (1974) was found to be 82.35, with a critical ratio of 30.53; values greater than 5.00 (Bentler, 2005) are suggested to be non-normally distributed. Hence, bootstrapping procedures were applied to account for the non-normality of the data. Overall model fit was assessed using the Bollen-Stine corrected $p$ value. Previous research has suggested that the five factor structure is appropriate for both males and females and for adults and adolescents (Goodwin et al., 2011; Taranis et al., 2011); hence the data were not separated for the analysis.

Confirmatory Factor Analysis was employed to examine the fit of the five factor model in this athlete sample. The analysis was conducted using IBM AMOS 20, employing the Maximum Likelihood Estimation procedure. Multiple goodness of fit indices were used to assess the factorial validity of the model including the significance of $\chi^2$, the normed chi-square, the Root Mean Square Error of Approximation (RMSEA), Tucker Lewis Index (TLI), Incremental Fit Index (IFI) and the Comparative Fit Index (CFI). An RMSEA value of <.06 indicates a good fitting model
(Hu & Bentler, 1999), and values of greater than .95 are considered a good fit of data for the remaining indices (Hu & Bentler, 1999). A cutoff of ≥ .40 was used to identify significant factor loadings (Ford, MacCallum & Tait, 1986).

Data that demonstrated poor fit were submitted to a principal components exploratory factor analysis, with direct oblimin (oblique) rotation. Oblique rotation was employed as it was expected that the factors would be correlated as they are assessing components of the same underlying compulsive exercise construct (Taranis et al., 2011). The sample size of 686 could be considered ‘very good’ for a factor analysis (>500, Comrey & Lee, 1992). Missing data were replaced with the means for the individual, and not the sample, to avoid reducing the sample variance (Hill & Lewicki, 2005). The analysis was conducted in SPSS 21.0.

**Results**

**Confirmatory Factor Analysis of the Compulsive Exercise Test Five Factor Structure**

Factor loadings for the items are shown in Figure 3.1. Item 8 “I do not exercise to be slim”, and Item 12 “I enjoy exercising”, did not meet the cutoff of ≥ .40, so were removed from further analysis. The five factor model showed a poor fit to the data, failing to sufficiently meet the goodness of fit criteria: $\chi^2(199) = 1196.55$, $p < .001$, RMSEA = 0.086, (90% CI [0.081, 0.090]), TLI = .79, IFI = .82, and CFI = .82.

The Bollen-Stine corrected $p$ was significant ($p$<0.001). Most of the latent variables were found to significantly co-vary with one another (Figure 1); however, the paths between Lack of Exercise Enjoyment and Exercise Rigidity and between Avoidance and Rule Driven Behaviour and Lack of Exercise Enjoyment did not. Removing the nonsignificant paths did not improve the overall fit.

An exploratory principal components analysis was considered appropriate to examine alternative model structures for the athlete sample. The analysis was conducted with the same participant group as for the Confirmatory Factor Analysis. This sequence of analysis has previously been reported by numerous published articles, where fit criteria were not met for CFA models (Darcy, Hardy, Crosby, Lock & Peebles, 2013; Lampard, Byrne, McLean & Fursland, 2011; Raykos, Byrne & Watson, 2009).
Figure 3.1 Path diagram for the original five factor model of the Compulsive Exercise Test
Exploratory Analysis of the Compulsive Exercise Test in Athletes

The exploratory principal components analysis was initially conducted separately for males and females, lean and nonlean athletes, and older and younger athletes (via a median split); no differences were found in the factor structure between these groups, so the data was subsequently analyzed as a whole. The data was not separated by competitive level due to the significant proportion of missing data.

Sufficient inter-item correlations existed, with 21 of the 24 items correlating with at least one item (> 0.3, Tabachnick & Fidell, 2001). The three items that did not correlate sufficiently were (a) Item 3 “I like my days to be organised and structured of which exercise is just one part”, (b) Item 8 “I do not exercise to be slim”, and (c) Item 12 “I enjoy exercising” (Taranis et al., 2011). These items were removed from subsequent analysis. The Kaiser-Meyer-Olkin test was employed as a measure of sampling adequacy (MSA = 0.86), indicating that inter-item correlations were compact. Bartlett’s test of sphericity was also significant, $\chi^2(210) = 5456, p < 0.001$.

Factor structure

The retention of factors was determined by a number of criteria. First, the Kaiser (1961) criterion of eigenvalues greater than one indicated a five factor solution that explained 61% of the variance. However, Horn’s parallel analysis (Horn, 1965) suggested a four factor solution, and scree plot analysis (Cattell, 1966) suggested a three factor solution. Ambiguity between the factor retention criteria required inspection of the communalities and the factor coefficients to determine the items that could be retained (Field, 2005). The average communalities for the three solutions were very similar: (a) the five factor solution .61, (b) the four factor solution .59, and (c) the three factor solution .60.

A cutoff of $\geq .40$ was implemented to identify significant factor coefficients (Ford et al., 1986); items that failed to meet this cutoff were removed. Item 11 “I usually continue to exercise despite injury or illness, unless I am very ill or too injured” and Item 15 “If I miss an exercise session, I will try and make up for it when I next exercise”, were therefore removed from further analysis. Factors with fewer than two items were deemed to be unstable, therefore these items were also removed (Pallant, 2007). This included (a) Item 7 “My weekly pattern of exercise is repetitive”, (b) Item 19 “I follow a set routine for my exercise sessions”, (c) Item 5 “I find exercise a chore”, and (d) Item 21 “I do not enjoy exercising”. Principal components analysis with oblique rotation was conducted with the remaining items, resulting in a three factor solution that explained 59.90% of the variance (Table 3.1).

Factor interpretation

The factors generated by the analysis were subject to interpretation. Factor 1 included six items, all of which were related to the avoidance of negative feelings that are experienced when
exercise is missed. An example of an item loading onto Factor 1 was Item 9: “If I cannot exercise I feel low or depressed.” This was consistent with the avoidance of negative affect component of the subscale Avoidance and Rule Driven Behaviour as identified by Taranis et al. (2011), thus was labeled *Avoidance of Negative Affect*. Two items were missing from the original subscale—Item 11 and Item 15—which were removed at an earlier stage of analysis.

The four items loading onto Factor 2 were related to exercising to improve appearance or for weight and shape reasons. An example of one of the items loading onto this factor is Item 18: “I exercise to burn calories and to lose weight.” This corresponds with the Weight Control Exercise subscale of the original Compulsive Exercise Test, although is missing Item 8, which was excluded earlier in the analysis. The *Weight Control Exercise* label was retained for this subscale.

The five items loading onto Factor 3 were related to the positive mood improvements associated with exercise. An example of an item loading on Factor 3 was Item 1: “I feel happier and/or more positive after I exercise.” The items loading onto this factor are identical to those on the Mood Improvement subscale identified by Taranis et al. (2011); this label was therefore retained. In summary, 15 items remain from the Compulsive Exercise Test after exploratory principal components analysis, with three subscales retained.
Table 3.1 Pattern matrix of Compulsive Exercise Test items

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1 Avoidance of Negative Affect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(20) If I cannot exercise I feel angry and/or frustrated</td>
<td>.81</td>
<td>-.04</td>
<td>.09</td>
</tr>
<tr>
<td>(23) If I cannot exercise I feel anxious</td>
<td>.78</td>
<td>.08</td>
<td>.08</td>
</tr>
<tr>
<td>(10) I feel extremely guilty when I miss an exercise session</td>
<td>.76</td>
<td>.11</td>
<td>-.05</td>
</tr>
<tr>
<td>(22) I feel like I’ve let myself down if I miss an exercise session</td>
<td>.76</td>
<td>.21</td>
<td>-.13</td>
</tr>
<tr>
<td>(16) If I cannot exercise I feel agitated and/or irritable</td>
<td>.69</td>
<td>-.11</td>
<td>-.25</td>
</tr>
<tr>
<td>(9) If I cannot exercise I feel low or depressed</td>
<td>.67</td>
<td>-.17</td>
<td>.15</td>
</tr>
<tr>
<td>Factor 2 Weight Control Exercise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(13) I exercise to burn calories and to lose weight</td>
<td>-.02</td>
<td>.86</td>
<td>.03</td>
</tr>
<tr>
<td>(2) I exercise to improve my appearance</td>
<td>-.16</td>
<td>.79</td>
<td>.17</td>
</tr>
<tr>
<td>(6) If I feel I have eaten too much, I will do more exercise</td>
<td>.13</td>
<td>.79</td>
<td>-.01</td>
</tr>
<tr>
<td>(18) If I cannot exercise, I worry that I will gain weight.</td>
<td>.39</td>
<td>.64</td>
<td>-.09</td>
</tr>
<tr>
<td>Factor 3 Mood Improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) I feel happier and/or more positive after I exercise</td>
<td>-.14</td>
<td>.12</td>
<td>.77</td>
</tr>
<tr>
<td>(14) I feel less stressed and/or tense after I exercise</td>
<td>-.05</td>
<td>.05</td>
<td>.73</td>
</tr>
<tr>
<td>(17) Exercise improves my mood</td>
<td>.17</td>
<td>-.02</td>
<td>.70</td>
</tr>
<tr>
<td>(4) I feel less anxious after I exercise</td>
<td>.17</td>
<td>.03</td>
<td>.62</td>
</tr>
<tr>
<td>(24) I feel less depressed or low after I exercise</td>
<td>.14</td>
<td>-.06</td>
<td>.51</td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>5.27</td>
<td>2.20</td>
<td>1.51</td>
</tr>
<tr>
<td>Variance (%)</td>
<td>35.15</td>
<td>14.67</td>
<td>10.10</td>
</tr>
</tbody>
</table>
Internal Consistency of the Compulsive Exercise Test

The internal consistency of the three factors was established using reliability analysis. Alpha coefficients were (a) Avoidance of Negative Affect .87, (b) Weight Control Exercise .82, (c) Mood Improvement .71, and (d) Global Score .62. Means and standard deviations for the three and five factor Compulsive Exercise Test subscales are given in Table 3.2. Means (with standard deviations in parentheses) for the Eating Disorder Examination Questionnaire subscales were (a) Restraint, $M = 1.31$ ($SD = 1.30$); (b) Eating Concern, $M = 0.68$ ($SD = 1.04$); (c) Shape Concern $M = 1.71$ ($SD = 1.53$); (d) Weight Concern, $M = 1.37$ ($SD = 1.42$); and (e) Global Score, $M = 1.27$ ($SD = 1.19$).

Table 3.2 Athlete norms for the five factor and three factor Compulsive Exercise Test subscales

<table>
<thead>
<tr>
<th>Subscale</th>
<th>M (SE)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoidance of Negative Affect (three factor)</td>
<td>2.47 (.04)</td>
<td>1.13</td>
</tr>
<tr>
<td>Weight Control Exercise (three factor)</td>
<td>2.23 (.04)</td>
<td>1.17</td>
</tr>
<tr>
<td>Mood Improvement (three factor and five factor)</td>
<td>3.48 (.03)</td>
<td>0.87</td>
</tr>
<tr>
<td>Global Score (three factor)</td>
<td>8.18 (.09)</td>
<td>2.40</td>
</tr>
<tr>
<td>Avoidance of Negative Affect and Rule Driven Behaviour (five factor)</td>
<td>2.51 (.04)</td>
<td>1.02</td>
</tr>
<tr>
<td>Weight Control Exercise (five factor)</td>
<td>2.33 (.04)</td>
<td>1.01</td>
</tr>
<tr>
<td>Exercise Rigidity (five factor)</td>
<td>3.09 (.04)</td>
<td>0.95</td>
</tr>
<tr>
<td>Lack of Exercise Enjoyment (five factor)</td>
<td>1.45 (.03)</td>
<td>0.87</td>
</tr>
<tr>
<td>Global Score (five factor)</td>
<td>12.85 (.11)</td>
<td>2.78</td>
</tr>
</tbody>
</table>

Convergent Validity with the Eating Disorder Examination Questionnaire

Correlation analysis. To assess the convergent validity of the Compulsive Exercise Test with an established measure of eating psychopathology, a series of two-tailed Spearman’s \( \rho \) correlations were conducted between the proposed three factor Compulsive Exercise Test and the Eating Disorder Examination Questionnaire. Strong positive correlations existed between all eating psychopathology subscales and (a) Weight Control Exercise, \( r(685) \geq 0.53, p < 0.01 \); (b) Avoidance of Negative Affect, \( r(685) \geq 0.31, p < 0.01 \); and (c) Global Score, \( r(685) \geq 0.47, p < 0.01 \). Smaller positive correlations were observed for the Mood Improvement subscale, \( r(685) \geq 0.16, p < 0.01 \).
Regression analysis. Stepwise regression analysis was conducted to assess the proportion of variance in Eating Disorder Examination Questionnaire scores that could be explained by scores on the three factor Compulsive Exercise Test. Gender, age, BMI, sport-type (lean or nonlean) and competitive level were also included as possible predictors, although only gender was retained as significant predictor for eating psychopathology scores. The total variance in eating psychopathology scores that could be explained by the regression model was 44%. The Weight Control Exercise subscale from the Compulsive Exercise Test could account for the largest amount of variance in Eating Disorder Examination Questionnaire scores (39%); the Avoidance of Negative Affect subscale accounted for a small, but significant, proportion of the variance (4%). The Mood Improvement subscale was not retained as a significant predictor (Table 3.3).

Discussion

This study aimed to evaluate the five factor structure of the Compulsive Exercise Test in an athlete sample, and to explore the relationship between compulsive exercise and eating psychopathology. The findings indicated that the five factor structure of the Compulsive Exercise Test represented a moderately good fit for the athlete sample. Exploratory analysis resulted in an alternative 15 item, three factor Compulsive Exercise Test. The factors were labeled (a) Avoidance of Negative Affect, (b) Weight Control Exercise, and (c) Mood Improvement. The Exercise Rigidity and Lack of Exercise Enjoyment subscales that have previously been validated in adolescent and female exercisers (Goodwin et al., 2011; Taranis et al., 2011) were not retained in this study. In support of the hypothesis, compulsive exercise and eating psychopathology scores were significantly and positive associated. Specifically, the Weight Control Exercise and Avoidance of Negative Affect subscales were found to explain a significant proportion of the variance in eating psychopathology scores.
Table 3.3 Stepwise regression analysis predicting eating psychopathology scores from three factor Compulsive Exercise Test scores in athletes

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Global score</th>
<th>Restraint</th>
<th>Eating concern</th>
<th>Shape concern</th>
<th>Weight concern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>ΔR²</td>
<td>β</td>
<td>ΔR²</td>
<td>β</td>
</tr>
<tr>
<td>Model 1</td>
<td>.39***</td>
<td>.28***</td>
<td>.26***</td>
<td>.38***</td>
<td>.32***</td>
</tr>
<tr>
<td>Weight control exercise</td>
<td>.63***</td>
<td>.53***</td>
<td>.51***</td>
<td>.62***</td>
<td>.57***</td>
</tr>
<tr>
<td>Model 2</td>
<td>.43***</td>
<td>.31***</td>
<td>.29***</td>
<td>.40***</td>
<td>.35***</td>
</tr>
<tr>
<td>Weight control exercise</td>
<td>.55***</td>
<td>.46***</td>
<td>.44***</td>
<td>.56***</td>
<td>.50***</td>
</tr>
<tr>
<td>Avoidance of negative affect</td>
<td>.21***</td>
<td>.19***</td>
<td>.20***</td>
<td>.17***</td>
<td>.19***</td>
</tr>
<tr>
<td>Model 3</td>
<td>.44***</td>
<td>.31***</td>
<td>.42***</td>
<td>.37***</td>
<td></td>
</tr>
<tr>
<td>Weight control exercise</td>
<td>.54***</td>
<td>.42***</td>
<td>.54***</td>
<td>.49***</td>
<td></td>
</tr>
<tr>
<td>Avoidance of negative affect</td>
<td>.20***</td>
<td>.19***</td>
<td>.16***</td>
<td>.18***</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-.09**</td>
<td>-.13**</td>
<td>-.14***</td>
<td>-.13***</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* ***Significant at p < .001; ** Significant at p < .01; ΔR² – Adjusted R squared; β – Standardised Beta*
The findings support a multidimensional model of compulsive exercise in athlete groups (Meyer et al., 2011). In addition to exercising for weight control, which has been consistently reported as an important motivation for exercise within the eating disorders (Fairburn et al., 2003), Avoidance of Negative Affect was identified as a core component of compulsive exercise among athletes. Compulsive exercise has been identified as a mood regulatory strategy, which is dysfunctional when maintained by negative reinforcement mechanisms (Meyer et al., 2011), and these findings indicate that exercise in athletes may also sometimes serve this function. Exercise can also be maintained by positive reinforcement mechanisms, as indicated by the retention of the Mood Improvement subscale. However, the Exercise Rigidity and Lack of Exercise Enjoyment components of compulsive exercise are likely to be less relevant for athletes. Indeed, the rule driven behaviour component of the original Avoidance and Rule Driven Behaviour subscale was dropped from the three factor model. Athlete exercise schedules are likely to be highly repetitive, habitual and performance oriented, particularly among those competing at an elite level. Such schedules may also be externally regulated or supervised by a coach. It is plausible that rigid, self-imposed exercise schedules that lack external regulation or specific performance goals may be more closely aligned with eating psychopathology. This suggests a need to explore internally motivated and externally imposed exercise rigidity in relation to eating psychopathology in athletes.

The Lack of Exercise Enjoyment subscale was also not retained for this sample. This may be surprising given that highly strenuous exercise is rarely associated with mood improvement (Reed & Buck, 2009) even when controlling for goal orientation (Motl, Berger & Wilson, 1996). However, the positive effects of exercise on mood are more likely to occur in those who exercise regularly (Hoffman & Hoffman, 2008), and athletes are likely to experience enjoyment when exercising with others or when working towards performance goals (McCarthy, Jones & Clark-Carter, 2008; Scanlan, Carpenter, Lobel & Simons, 1993). It is important to note that the original Exercise Rigidity and Lack of Exercise Enjoyment subscales had only three items and may have lacked initial stability (Pallant, 2007). The proposed factor structure requires replication with additional athlete samples, but this study suggests that the subscales of Lack of Exercise Enjoyment and Exercise Rigidity need to be interpreted with caution with athlete groups.

A significant strength of this study is the large sample of competitive athletes that were included. The sample did, however, pose some limitations to the conclusions that can be drawn from this study. The majority of the samples in both studies were endurance athletes and ball sport players, and participant groups for the two studies were not equal in terms of the percentage of lean and non-lean athletes. Competitive level data was also missing for a significant proportion of the sample, and it is acknowledged that this could have a significant impact both on the interpretation of the results (Acuna & Rodriguez, 2004) and in reducing the replicability of the study. The data were not separated by competitive level for the exploratory analysis, due to the proportion that was
missing, however the literature exploring the impact of competitive level on eating psychopathology in athletes has been somewhat inconclusive (Picard, 1999; Smolak et al., 2000; Toro et al., 2005). It was therefore not considered problematic to explore the sample as a whole within this study. However, it is an important avenue for future work to compare compulsive exercise across athletes at differing competitive levels. This is important as it is plausible to suggest that competition intensity and training level may be an important factor in both levels of compulsive exercise and the relationship between compulsive exercise and eating psychopathology.

Similarly, the three factor structure proposed requires replication across lean and non-lean sports, and for athlete groups for which there were low numbers for this study; notably, aesthetic, power, technical and weight-dependent athletes. It is important to assess whether the three factor structure of the Compulsive Exercise Test is relevant for athletes outside of ball sports and endurance sports. In addition, it is recommended that invariance testing for gender, competitive level and age is conducted to further validate the proposed athlete model. The variance in eating psychopathology accounted for by the Compulsive Exercise Test subscales was lower than in previous studies (Goodwin et al., 2011; Taranis et al., 2011). Additional factors could account for some of the variance that is not captured by the Compulsive Exercise Test, notably perfectionism. An important next step would therefore be the inclusion of a validated measure of perfectionism to assess the relationship with eating psychopathology and compulsive exercise in athlete groups. Further improvements are also needed in determining the relationship between eating psychopathology and compulsive exercise in athlete groups. One way to do this would be to use the Eating Disorders Examination (Fairburn & Cooper, 1993) to establish eating disorder diagnosis. Longitudinal investigations would help to establish the direction of the relationship between compulsive exercise and eating psychopathology in athletes.

**Conclusions**

This study provides support for the multidimensional model of compulsive exercise in athletes, indicating a particularly strong relationship between exercising for weight control and for mood regulation with eating psychopathology. The original five factor structure of the Compulsive Exercise Test showed a poor fit; a three factor structure may be more appropriate when assessing and comparing athlete groups. In particular, this study suggests that the Exercise Rigidity and the Lack of Exercise Enjoyment subscales may be less relevant for athletes, and thus should be interpreted with caution by researchers and clinicians.

The Weight Control Exercise, Avoidance of Negative Affect and Mood Improvement subscales may potentially provide a valid method of assessment of athletes on cognitive behavioural features of compulsive exercise. The Compulsive Exercise Test may therefore be an important, and useful, tool for sport psychologists and other practitioners working within the sports
context to detect unhealthy attitudes towards exercise among athletes. The Compulsive Exercise Test can be used as a screening measure due to its ease of administration and support practitioners in detecting athletes who are motivated to exercise for weight control and mood regulation; factors which are strongly associated with increased eating problems. As a measure of exercise attitudes and behaviours, the Compulsive Exercise Test may also be more readily received and completed by athletes in comparison to a measure of eating psychopathology. This study makes an important contribution to the literature in exploring the concept of compulsive exercise within an athlete sample. The findings can inform the development and tailoring of eating disorder therapies that are specific to the needs of athletes, which do not currently exist.
Chapter 4  
Validity of the Compulsive Exercise Test in screening for eating psychopathology among competitive athletes

4.1 Introduction

This chapter describes the second quantitative study in this thesis. The results from the first study established that the Compulsive Exercise Test may require modifications for use with athletes. In particular, the Exercise Rigidity and Lack of Exercise Enjoyment factors did not emerge as relevant for an athlete sample. Importantly, the previous study demonstrated a significant relationship between compulsive exercise and eating psychopathology in an athlete sample, indicating close links between the two constructs. Using the newly modified version of the Compulsive Exercise Test (the athlete version of the CET; CET-A), the present study aims to establish whether the measure can successfully identify athletes with elevated levels of eating psychopathology, and to identify a cut-off score on the measure at which such athletes can be identified.
4.2 Study 2: Validity of the Compulsive Exercise Test in screening for eating psychopathology among competitive athletes

The following study has been submitted for publication. Small changes have been made to the format to ensure it remains in line with the rest of the thesis.


**Abstract**

**Objective:** The current study had two main aims. First, to evaluate the criterion validity of the athlete version of the Compulsive Exercise Test (CET-A) by determining its associations with levels of eating psychopathology among a sample of athletes. Second, to present a cut-off value for the CET-A, which could be used to identify athletes with elevated levels of eating psychopathology. **Method:** A sample of 547 athletes completed the CET-A and Eating Disorder Examination Questionnaire (EDE-Q). The athletes were recruited to include a broad range of eating attitudes including 15 who were currently seeking treatment for an eating disorder. **Results:** Spearman’s Rho correlations indicated significant, positive associations between the Avoidance of Negative Affect, Weight Control Exercise and Global scores on the CET-A with EDE-Q scores. A Receiver Operating Curve (ROC) analysis indicated that a cut-off score of 10.00 on the CET-A was appropriate in distinguishing between athletes with and without a current eating disorder, and represented the optimal trade-off between specificity (.80) and sensitivity (.79). Relative risk statistics revealed that athletes scoring above the cut-off score were nearly 4 times more likely to have a diagnosis of an eating disorder than those below the cut-off. **Discussion:** The CET-A may be a useful tool for identifying the early signs and symptoms of eating psychopathology among athletes and points to the need for further assessment of those who score above 10.00 on the global scale of the measure. Future research with the CET-A should explore the predictive value of the measure in detecting eating psychopathology in this group.

**Introduction**

Eating disorders are difficult to identify at an early stage (Sim et al., 2010; Walsh, Wheat & Freund, 2000). This is partly due to the secretive nature of the disorders (e.g., Vandereckyen & Van Humbeeck, 2008) and the wide variety of risk factors that can elicit the onset of behaviours (e.g., Jacobi, Hayward, de Zwann, Kraemer & Agras, 2004; Striegel-Moore & Bulik, 2007). One such risk factor is compulsive exercise, which has been implicated in both the onset and severity of...
eating pathology, with exercising patients requiring longer to recover and being more likely to relapse (e.g., Carter, Blackmore, Sutandar-Pinnock & Woodside, 2004; Dalle Grave Calugi, & Marchesini, 2008). Given this relationship between exercise and eating psychopathology, it is perhaps unsurprising that athletes have been found to be at an increased risk of eating psychopathology (Sundgot-Borgen & Torstveit, 2004). The increased occurrence of eating disorders in athletes is likely to be a combination of sports-specific and general risk factors (Bratland-Sanda & Sundgot-Borgen, 2013; Thompson & Sherman, 2010).

Identifying and treating eating disorders at an early stage is important for improved prognosis and long term recovery (e.g., Reas, Williamson, Martin & Zucker, 2000; Zipfel, Lowe, Reas, Deter & Herzog, 2000). As a result, research has focused on identifying the early warning signs and risk factors for eating disorders, in order to prevent the potential development of clinical eating disorders among vulnerable groups (Striegel-Moore & Bulik, 2007). Indeed, a variety of risk factors for eating disorders have been identified for the athletic population (e.g., Shanmugam, Jowett & Meyer, 2012; Torres-McGehee, Monsma, Dompier & Washburn, 2012; Torstveit, Rosenvinge & Sundgot-Borgen, 2008). However, it is inherently difficult to overcome some of the underreporting biases that exist when exploring eating attitudes and behaviours (Vitousek, Daly & Heiser, 1991). Indeed, research has demonstrated a tendency among athletes to underreport disordered eating attitudes and behaviours on eating measures (Brownell & Rodin, 1992; Johnson, Powers & Dick, 1999). Most existing self-report measures of eating attitudes and behaviours include items that are clearly related to eating and therefore subject to bias (Vitousek et al., 1991). The tendency of athletes to distort their responses may be due to concerns about being prevented from training, a loss of financial support or fears of the stigma associated with a mental illness (Guillver, Griffiths & Christensen, 2012; Thompson & Sherman, 2010; Yates, Edman, Crago & Crowell, 2001). An instrument that focuses on exercise attitudes and behaviours may therefore be more acceptable for use within an athlete population, and facilitate the identification of eating psychopathology more successfully.

It might be expected that exercise-based measures for detecting eating psychopathology would have low face validity and as such may identify a large number of at risk individuals (Yates et al., 2001). However, the recently developed Compulsive Exercise Test (CET; Taranis, Touyz & Meyer, 2011) has been shown to explain a large proportion of the variance in EDE-Q scores among adolescent and adult exercisers (Goodwin, Haycraft, Taranis & Meyer, 2011; Taranis, Touyz & Meyer, 2011) and more recently, among athletes (Plateau et al., 2014; Study 1). The measure integrates multidimensional components of exercise cognitions and behaviours that are relevant for eating psychopathology (Taranis et al., 2011). In particular, exercising to control weight and shape, and to avoid negative affect have been found to be highly predictive of EDE-Q scores in male and female athletes (Plateau et al., 2014; Study 1).
The next logical step is to consider whether the Compulsive Exercise Test can successfully identify athletes with elevated levels of eating psychopathology, and those with low levels of pathology. Screening measures have previously been developed within the field to support physicians, dieticians, psychologists and other professionals in identifying eating disorders. For example, the SCOFF screening measure was developed specifically for use within the primary care domain, to support general practitioners in identifying eating disorders among the general patient population (Morgan, Reid & Lacey, 1999) to further support practitioner success in identifying the early signs and symptoms (Hugo, Kendrick, Reid & Lacey, 2000). There is a need for a screening measure that is suitable for use with athletes, which can be administered within the sports context, and which reduces the possibility of social desirability response biases. An exercise based measure seems a logical and appropriate method to explore risk for eating psychopathology among athletes.

From a practical perspective, providing sports professionals, coaches and sports governing bodies with a screening measure that could be utilised to detect athletes that may be at a heightened risk of eating psychopathology would be useful in helping them to identify those athletes who may require further investigation into their eating attitudes and behaviours. Establishing a cut-off at which athletes may be deemed to be at an increased risk of eating disorders is an important function for this screening measure in order for it to be successfully utilised within the field. Therefore, this study aimed to establish the criterion validity of the CET-A in relation to levels of eating psychopathology and to identify an appropriate cut-off score to allow the successful identification of athletes who are at an increased risk of eating psychopathology. It was predicted that CET-A scores would be significantly, positively associated with EDE-Q scores. It was also predicted that scores on the CET-A would sufficiently distinguish athletes with high levels of eating psychopathology from athletes with low levels of eating psychopathology.

**Method**

**Participants and procedure**

Ethical approval for this study was granted from both University and NHS ethical advisory committees. For the purpose of this study, athletes were defined as those who trained and competed in one or more sports, and who had been doing so for a minimum of 6 months. In addition, the participant’s first language had to be English, and all participants had to be over the age of 18 years. A total of 596 athletes \( n = 222 \) males) were recruited from sports clubs at British Universities and community sports clubs in the UK. Athletes with current eating disorders completed the questionnaires as part of studies 6 and 7 \( n = 15 \). Some of the athletes who took part in this study also provided data for study 3 \( n = 262 \).

A total of 25 \( (4.2\%) \) participants reported a current eating disorder. Of these, fifteen were recruited from four NHS eating disorder services as part of another study. Recruitment of these participants has been described in Chapter 2. These participants were currently receiving treatment.
for an eating disorder. Seven had a diagnosis of bulimia nervosa, four had a diagnosis of anorexia nervosa, and the remaining four had a diagnosis of eating disorder not otherwise specified (EDNOS). The mean length of time that these participants reported having had their eating disorder symptoms for was 8.60 years, ranging between 6 months and 32 years. The ten athletes who reported a current eating disorder on the online questionnaire were removed from the analysis as their eating disorder status could not be verified. Similarly, a further 39 (6.5%) reported a previous eating disorder on the online survey. These participants were removed from the analysis to ensure that only current cases and non-cases were compared. Therefore 15 confirmed eating disorder cases were included in the analysis. A similar sample size of clinical cases has been used in previous research within the eating disorder literature when identifying appropriate cut-off scores on screening measures for eating disorder identification (e.g. Mond, Hay, Rodgers, Owen & Beumont, 2004).

A total of 547 athletes remained in the sample. The ages of these participants ranged from 18 years to 48 years ($M = 23.40y; SD = 4.35$), and had a mean BMI of 21.87kg/m$^2$ (ranging from 14.45 to 33.39kg/m$^2$). Participants reported training and competing in a range of sports, and were classified according to the system used by Torstveit and Sundgot-Borgen (2005). The majority of the sample took part in endurance sports (53.0%; $n = 290$) or ball sports (26.7%, $n = 146$), with small numbers taking part in power sports (9.7%, $n = 53$), weight dependent (2.7%, $n = 15$), anti-gravitational (3.1%, $n = 17$), aesthetic (3.3%, $n = 18$), and technical sports (1.5%, $n = 8$). In total, therefore, 62.1% of the sample participated in lean sports, and 37.9% of the sample participated in non-lean sports. One quarter of the sample (26.1%) competed for their club or county, 28.5% of the sample competed for their university or region, and 45.4% of the sample competed at national or international level within their sport.

Participants completed the following questionnaire items either via an online survey or via direct approach by the researcher at training sessions and competitions. Some of the clinical participants completed these questionnaires as part of another study, and thus were approached by their clinician at NHS eating disorder services, and asked whether they would be interested in participating. All of the participants were provided with information about the study and completed an informed consent form prior to completing the questionnaires. Participants were informed that they were able to withdraw from the study at any time, including after they had submitted their questionnaire.

**Materials**

Participants completed a demographic questionnaire, which included items concerning age, weight, height, sporting and eating disorder history. They then completed the athlete version of Compulsive Exercise Test (Plateau et al., 2014; Study 1) and the Eating Disorder Examination Questionnaire (Fairburn & Beglin, 2008).
The Compulsive Exercise Test – Athlete version (CET-A; Plateau et al., 2014; Study 1)

The CET-A is based on the original Compulsive Exercise Test (Taranis, Touyz & Meyer, 2011), which was developed to assess the multidimensional nature of exercise in relation to disordered eating. The athlete version of the measure incorporates only those elements of compulsive exercise that have been identified as relevant for athletes (Plateau et al., 2014; Study 1). The measure has three subscales, including Avoidance of Negative Affect, Weight Control Exercise and Mood Improvement. It is a 15-item self-report questionnaire, where participants indicate the extent to which each statement is true on a 6 point Likert scale from 0 (Never true) to 5 (Always true). The reliability of the subscales and overall score were found to be acceptable within this study: Avoidance of Negative Affect (α =.86) Weight Control Exercise (α =.84) Mood Improvement (α =.73) and Global Score (α =.86)

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008)

Participants also completed the 28-item EDE-Q (version 6.0; Fairburn & Beglin, 2008). The Eating Disorder Examination Questionnaire is the questionnaire version of the Eating Disorder Examination, (Fairburn & Cooper, 1993) which is the clinician-delivered gold standard interview for assessing eating psychopathology within the clinical context. Participants reflect upon their eating attitudes and behaviours over the preceding 28-day period, and indicate how many days they experienced various feelings with regards to their weight and shape, and engaged in disordered eating behaviours. The EDE-Q is scored on a 7 point Likert scale from 0 (No Days) to 6 (Every Day). The EDE-Q has previously been used with athletes (e.g. Hulley & Hill, 2001; Shanmugam, Jowett & Meyer, 2014). The reliability of the EDE-Q subscales and global score were found to be good within this study: Restraint (α =.80), Eating Concern (α =.86), Shape Concern (α =.92), Weight Concern (α =.86) and Global Score (α =.91)

Data analysis

All analyses were conducted in IBM Statistics, SPSS version 21.0. The data were initially assessed for normality. Inspection of the histograms and Kolmogorov-Smirnov statistics suggested that the EDE-Q subscales and global scores were not normally distributed. In addition, large differences in the clinical and non-clinical group sizes meant that non-parametric tests were employed to assess the differences in EDE-Q and CET-A scores between the clinical and non-clinical groups (Clark-Carter, 2010). Preliminary investigations were conducted to assess whether gender differences existed for scores on the EDE-Q and CET-A. Two-tailed Spearman’s Rho correlations were subsequently conducted separately for males and females to assess associations between the CET and EDE-Q subscales (to address the first aim). For the second aim of the study, CET-A global scores were found to be normally distributed, hence receiver operating curve (ROC)
analysis was conducted to assess the criterion validity of the CET-A in distinguishing between eating disorder cases \( (n = 15) \) and non-cases \( (n = 532) \). ROC analysis is considered a gold standard technique in differentiating the normal population from those who meet clinical criteria for a particular disorder, based on the outcome from one measure (Metz, 1978). This form of analysis has previously been used with screening measures within the eating disorders literature, which used similar sample sizes of diagnosed cases (e.g., Mond et al., 2004; Mond, Myers, Crosby, Hay, Rodgers et al., 2008) to establish the validity of self-report measures in comparison to clinician diagnoses, and in establishing appropriate cut-off scores. A cut-off score on the CET-A was determined by considering the sensitivity (the number of athletes with current eating disorders scoring above the cut-off score) and specificity (the number of athletes without an eating disorder scoring below the cut off score) values – i.e. how accurate the measure is at both identifying positive cases and excluding negative cases. The Area under the Curve (AUC) and Positive Predictive Values (PPV) were calculated to ensure an appropriate cut-off for the measure could be identified (Metz, 1978). Positive Predictive Values were identified by cross tabulation. Characteristics of the group scoring above and below the cut-off and relative risk statistics were explored through a series of chi-squared tests of independence.

**Results**

**Characteristics of the sample and preliminary analyses**

Table 4.1 indicates the mean scores and significant differences between the clinical and non-clinical groups on the CET-A and EDE-Q subscales. The clinical eating disorder group scored significantly higher than the non-eating disorder group on all of the subscales of the EDE-Q, and on the Avoidance, Weight Control Exercise and Global scores of the CET-A. Mann Whitney U tests also indicated significant differences between male and female athletes on both the CET-A and EDE-Q scores (Table 4.2). Female athletes scored significantly higher than male athletes on all subscales of the EDE-Q and CET-A, apart from Mood Improvement.
Table 4.1 Mean scores on the Eating Disorder Examination Questionnaire and the Compulsive Exercise Test (athlete version) for the eating disorder cases ($n = 15$) and non-cases ($n = 532$).

<table>
<thead>
<tr>
<th></th>
<th>Current eating disorder</th>
<th>No eating disorder</th>
<th>Mann Whitney U (Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EDE-Q</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restraint</td>
<td>2.81 (1.46)</td>
<td>1.28 (1.35)</td>
<td>3.78*</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>3.41 (1.71)</td>
<td>.70 (1.09)</td>
<td>5.44*</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>4.08 (1.50)</td>
<td>1.70 (1.55)</td>
<td>4.70*</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>3.43 (1.36)</td>
<td>1.28 (1.43)</td>
<td>4.76*</td>
</tr>
<tr>
<td>Global Score</td>
<td>3.43 (1.35)</td>
<td>1.24 (1.22)</td>
<td>5.01*</td>
</tr>
<tr>
<td><strong>CET-A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance</td>
<td>3.64 (1.56)</td>
<td>2.30 (1.10)</td>
<td>3.67*</td>
</tr>
<tr>
<td>Weight Control Exercise</td>
<td>3.45 (1.00)</td>
<td>2.23 (1.19)</td>
<td>3.70*</td>
</tr>
<tr>
<td>Mood Improvement</td>
<td>3.95 (1.01)</td>
<td>3.51 (0.84)</td>
<td>1.96</td>
</tr>
<tr>
<td>Global Score</td>
<td>11.04 (2.98)</td>
<td>8.04 (2.41)</td>
<td>3.99*</td>
</tr>
</tbody>
</table>

*p<0.01
Table 4.2 Mean scores on the Eating Disorder Examination Questionnaire and the Compulsive Exercise Test (athlete version) for male \((n = 217)\) and female \((n = 330)\) athletes.

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
<th>Mann Whitney U (Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EDE-Q</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restraint</td>
<td>1.06 (.14)</td>
<td>1.50 (1.48)</td>
<td>3.21*</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>.37 (.61)</td>
<td>1.06 (1.14)</td>
<td>5.83*</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>1.20 (1.24)</td>
<td>2.14 (1.69)</td>
<td>6.66*</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>.81 (1.07)</td>
<td>1.69 (1.59)</td>
<td>6.96*</td>
</tr>
<tr>
<td>Global Score</td>
<td>.87 (.89)</td>
<td>1.58 (1.40)</td>
<td>5.89*</td>
</tr>
<tr>
<td><strong>CET-A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance</td>
<td>2.15 (1.06)</td>
<td>2.46 (1.16)</td>
<td>2.84*</td>
</tr>
<tr>
<td>Weight Control Exercise</td>
<td>1.87 (1.06)</td>
<td>2.25 (1.22)</td>
<td>6.21*</td>
</tr>
<tr>
<td>Mood Improvement</td>
<td>3.44 (.86)</td>
<td>3.58 (.83)</td>
<td>1.65</td>
</tr>
<tr>
<td>Global Score</td>
<td>7.46 (2.28)</td>
<td>8.56 (2.51)</td>
<td>4.89*</td>
</tr>
</tbody>
</table>

*\(p<0.01\)

**Associations between compulsive exercise and eating psychopathology**

Two-tailed Spearman’s Rho correlation coefficients were subsequently calculated for male and female athletes separately (Table 4.3) due to differences in the mean scores. Significant positive correlations were observed for both males and females between the Avoidance, Weight Control Exercise and Global scores of the CET-A and all of the EDE-Q subscales. The Mood Improvement subscale showed weak positive correlations with EDE-Q scores among female athletes, but was not found to be related to EDE-Q scores among male athletes.
Table 4.3 Two-tailed Spearman’s Rho correlations between the Eating Disorder Examination Questionnaire and Compulsive Exercise Test (athlete version) for male ($n = 217$) and female ($n = 330$) athletes.

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CET-A</td>
<td>CET-A</td>
</tr>
<tr>
<td></td>
<td>Avoidance</td>
<td>Weight control exercise</td>
</tr>
<tr>
<td>EDE-Q</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restraint</td>
<td>.46*</td>
<td>.70*</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>.43*</td>
<td>.68*</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>.44*</td>
<td>.74*</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>.42*</td>
<td>.70*</td>
</tr>
<tr>
<td>Global Score</td>
<td>.48*</td>
<td>.77*</td>
</tr>
</tbody>
</table>

*Signifies $p<0.01$
Criterion validity of the CET-A and establishing a cut-off score.

Male and female athlete data were combined to establish the criterion validity of the CET-A, as similar patterns of association were observed between the CET-A and EDE-Q for the two genders. In addition, there were only a small number of males within the clinical sample ($n = 2$). Receiver Operating Curve (ROC) analysis was therefore conducted with the total sample of 547 athletes, including 15 athletes with a confirmed clinical eating disorder. The Global CET-A score was evaluated in comparison to confirmed eating disorder status. The analysis indicated that the area under the curve was significant: Area (SE) = .80, (0.07) $p<0.05$; [95% CI of area: 0.65 - 0.95]. The sensitivity, specificity and positive predictive values of the CET-A Global Score were evaluated for the potential cut-off values.

Table 4.4 indicates the sensitivity (number of true positive cases correctly identified) and the specificity (the number of true negative cases correctly excluded) at the different cut-off scores on the Global Score of the CET-A. Sensitivity decreases with increasing score on the CET-A, particularly beyond a score of 10.00. The specificity of the measure improves as the cut-off score increases, as does the positive predictive value. In establishing an appropriate cut-off score, a trade-off between sensitivity and specificity is often required (e.g. Mond et al., 2004; 2008), although this may depend on the intended purpose of the measure. For example, sensitivity is often prioritised for screening measures, to ensure that all clinical cases are detected (Dovey, Jordan, Aldridge & Martin, 2013; Mond et al., 2008; Warner, 2004; Wilson & Junger, 1968). A cut-off of 5.00 would maximise sensitivity (.93) but specificity would be low (.10), as would the positive predictive value (.03). A trade-off between sensitivity and specificity was therefore deemed most appropriate for the CET-A. A cut-off greater than or equal to a global score of 10.00 on the CET-A was identified as the most appropriate point at which the measure can distinguish between athletes with and without a clinical eating disorder diagnosis. At this level, sensitivity remained high (.80) and specificity was good (.79). The global score on the CET-A is the sum of the mean of the three subscales, Avoidance of Negative Affect, Weight Control Exercise and Mood Improvement. Optimising both sensitivity and specificity resulted in three true positive cases (20%) screening negative according to the 10.00 cut-off criteria. Further assessment of these cases did not reveal anything significant other than their lowered scores on the CET-A.
Table 4.4 Sensitivity and specificity of the CET-A in distinguishing athletes with and without a current eating disorder.

<table>
<thead>
<tr>
<th>Cut off CET-A Global Score</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive Predictive Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00</td>
<td>.87</td>
<td>.52</td>
<td>.05</td>
</tr>
<tr>
<td>8.50</td>
<td>.87</td>
<td>.59</td>
<td>.06</td>
</tr>
<tr>
<td>9.00</td>
<td>.87</td>
<td>.66</td>
<td>.07</td>
</tr>
<tr>
<td>9.50</td>
<td>.87</td>
<td>.73</td>
<td>.08</td>
</tr>
<tr>
<td>10.00</td>
<td>.80</td>
<td>.79</td>
<td>.10</td>
</tr>
<tr>
<td>10.50</td>
<td>.67</td>
<td>.84</td>
<td>.10</td>
</tr>
</tbody>
</table>

Characteristics of participants scoring above and below the cut-off

Table 4.5 displays post-hoc Mann Whitney U tests indicating that those scoring above the cut-off of 10.00 on the Global Score of the CET-A, scored significantly higher on all subscales and on the global score of the EDE-Q than those scoring below the cut-off. A chi-squared test of independence revealed a significant association between screen status and clinical ED status \( \chi^2 (1) = 27.56, p<0.01 \). There were no significant differences found for age or BMI between the two groups.

There was a higher proportion of females in the positive screen group (78%, \( n = 100 \)) than in the negative screen group (55%, \( n = 230 \)). A chi-squared test of independence indicated a significant association between gender and screen status \( \chi^2 (1) = 22.11, p<0.01 \). With regards to sport type, similar proportions of lean athletes were present in the positive (68.8%, \( n = 88 \)) and the negative screen group (60.1%, \( n = 252 \)). A chi-squared test of independence revealed no significant association between sport type and screen status \( \chi^2 (1) = 3.09, p=0.09 \). With regards to competitive level, similar proportions of elite and sub elite athletes were present in the positive (elite 43.8%, \( n = 56 \); sub elite 28.9% \( n = 37 \)) and negative screen groups (elite 45.8%, \( n = 192 \); sub elite 28.4%, \( n = 119 \)). No significant association was found between competitive level and screen status on the chi-squared test of independence \( \chi^2 (2) = .19, p=0.91 \). Relative risk statistics indicated that those scoring above the proposed cut-off of 10.00 on the Global Score of the CET-A were nearly 4 times more likely to have an eating disorder than those scoring below the cut-off \( RR = 3.91, p<0.01, [95\% CI = 1.42 - 10.77] \).
Table 4.5 Characteristics of the groups scoring positively (n = 128) and negatively (n = 419) on the Global CET-A (employing the proposed cut-off of 10.00).

<table>
<thead>
<tr>
<th></th>
<th>Negative screen (Below cut off)</th>
<th>Positive screen (Above cut off)</th>
<th>Mann Whitney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>23.36 (4.05)</td>
<td>23.53 (5.23)</td>
<td>0.22</td>
</tr>
<tr>
<td>BMI</td>
<td>21.95 (2.71)</td>
<td>21.60 (2.91)</td>
<td>2.34</td>
</tr>
</tbody>
</table>

**EDE-Q**

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mann Whitney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restraint</td>
<td>0.91 (1.04)</td>
<td>2.64 (1.49)</td>
<td>10.36*</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>0.43 (.74)</td>
<td>1.88 (1.63)</td>
<td>10.03*</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>1.27 (1.23)</td>
<td>3.37 (1.62)</td>
<td>10.77*</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>0.89 (1.06.)</td>
<td>2.80 (1.64)</td>
<td>10.14*</td>
</tr>
<tr>
<td>Global Score</td>
<td>0.87 (.86)</td>
<td>2.66 (1.43)</td>
<td>11.06*</td>
</tr>
</tbody>
</table>

**CET-A**

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mann Whitney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Score</td>
<td>7.10 (1.76)</td>
<td>11.48 (1.19)</td>
<td>15.58*</td>
</tr>
</tbody>
</table>

*p<0.01

**Discussion**

The primary aims of this study were to establish the criterion validity of the athlete version of the Compulsive Exercise Test (CET-A) by determining links with the Eating Disorder Examination Questionnaire (EDE-Q) and to identify an appropriate cut-off to facilitate the detection of athletes with potentially clinically significant levels of eating psychopathology. A cut-off of 10.00 on the CET-A global subscale emerged as most appropriate to detect athletes with elevated levels of eating psychopathology. The analysis indicated no relationship between sport-type or competitive level and screen status (scores above versus below 10), suggesting that the measure is suitable for use with athletes across a wide variety of sports and of all abilities.

At a cut-off of 10.00, the sensitivity of the CET-A was sufficiently high to detect 80% of athletes with clinical eating disorders. This is superior to other eating disorder screening instruments widely used within the field (e.g., Mond et al., 2004). A number of athletes without clinical eating disorders also scored above the cut-off on the CET-A, however this group had significantly elevated levels on the EDE-Q subscales in comparison to those scoring below the cut-off. Indeed, the mean EDE-Q global score of the group screening positive was above the empirically derived threshold (≥ 2.30) for detecting eating disorders in community samples (Mond et al., 2004) suggesting that the CET-A is a valid instrument with which to detect eating psychopathology among athlete samples. The positive predictive value of the measure was low,
however this was perhaps to be expected given that the measure is assessing exercise, rather than eating psychopathology directly (Yates et al., 2001). It is suggested that a false positive result on a screening measure is perhaps more favourable than missing potential cases through false negative results. Indeed, sensitivity has been identified as the most important feature of a screening measure in detecting the presence of a disorder (Warner, 2004; Wilson & Junger, 1968).

The findings indicated no associations existed between sport type and competitive level with screen status. The findings are consistent with the literature with regards to the absence of a relationship between competitive level and eating psychopathology (Smolak, Murnen & Ruble, 1999), and suggest that compulsive exercise behaviours occur among athletes at all levels of competition. There is some previous evidence to suggest that athletes in lean sports may be more vulnerable to eating psychopathology (Smolak et al., 1999; Sundgot-Borgen & Torstveit, 2004), however this was not found to be the case in this study. It is suggested that the motivations for exercise (such as the prevention of negative affect or exercising for weight and shape reasons; Taranis et al., 2011) are clearly linked with eating psychopathology, and that this relationship occurs regardless of sport-type or competitive status. Whilst it is acknowledged that elements of the sport environment can increase or decrease vulnerability to eating psychopathology (Bratland-Sanda & Sundgot-Borgen, 2013), these findings suggest that athletes’ reasons for exercising are perhaps more important factors in determining eating psychopathology risk.

This study serves to strengthen the identified relationship between eating psychopathology and compulsive exercise, which has been shown previously within the literature among exercisers and athletes alike (Goodwin et al., 2011; Plateau et al., 2014 (Study 1); Taranis et al., 2011). Indeed, the prevalence of eating disorders has been consistently demonstrated to be high among athletes (e.g., Sundgot-Borgen & Torstveit, 2004), and consequently, the field has focused on developing athlete-specific screening measures to identify vulnerable individuals (e.g. Bonci et al., 2008; Martinsen, Holme, Pensgaard, Torstveit & Sundgot-Borgen, 2014; McNulty, Adams, Anderson & Affenito, 2001). However, the majority of these measures have focused on questioning athletes’ eating attitudes and behaviours as opposed to exercise behaviours (Yates et al., 2001). Exercise based measures may be more appropriate, given that athletes may underreport disordered eating and attitudes due to concerns about being excluded from training (Brownwell & Rodin, 1992; Johnson, Powers & Dick, 1999). This study is innovative in exploring the potential of an exercise based screening measure to identify athletes at an increased risk of eating psychopathology. Given that unhealthy exercise attitudes and behaviours have been implicated in the development of eating disorders (Davis, Kennedy, Ravelski & Dionne, 1994; Davis et al., 1997), such an approach may facilitate identifying athletes with elevated levels of eating psychopathology at an earlier stage than screening measures focusing on eating attitudes and behaviour.
It is important to also recognise the limitations of this study. First, by using any statistically determined criteria to determine clinical significant eating problems, it is highly likely that a number of ‘false’ results will occur (Metz, 1978). In particular, a large number of athletes without a clinical eating disorder diagnosis scored above 10.00 on the CET-A. These athletes may then be referred for further investigation, which may be unnecessary in some cases. Similarly, athletes with potentially clinically significant eating problems may score below the cut-off on the CET-A, and not receive the additional support they require. Whilst the measure has the potential to be very useful within the sports setting, it is recommended that the proposed cut-offs are treated with caution, and where eating psychopathology is suspected, athletes should be referred for further assessment, regardless of whether they score above the cut-off on the CET. While compulsive exercise is a common feature of eating disorders (Mond, Hay, Rodgers, & Owen, 2006; Shroff et al., 2006), it is not part of the Diagnostic and Statistical Manual of Mental Disorders diagnostic criteria (5th ed.; DSM-5; APA, 2013). It is possible that some athletes with elevated levels of eating psychopathology will not present with changes to their exercise attitudes and behaviours as measured by the CET-A.

A second limitation was the cross sectional approach adopted within this study. The temporal relationship between compulsive exercise and eating psychopathology in athletes has yet to be established longitudinally. Further research should explore whether scoring above the cut-off on the CET-A is predictive of the future onset of eating psychopathology among athletes. This is an important step to further validate the proposed cut-off score.

Third, the number of athletes with confirmed clinical eating disorders included in this study was low. It is suggested that a more accurate cut-off could be generated if a larger sample of athletes with confirmed clinical and subclinical eating disorders were to be included. An improvement to this study would be to establish eating disorder diagnosis using the Eating Disorders Examination (Fairburn & Cooper, 1993), particularly among athletes recruited outside of eating disorder services. Indeed, the self-report EDE-Q can overestimate the severity of eating psychopathology (e.g. Mond, Hay, Rodgers, Owen & Beumont, 2004; Passi, Bryson & Lock; 2003). However, in a large sample such as this, using the clinical interview would be both time consuming and costly.

Finally, the CET is a self-report inventory that has yet to be validated with an interview assessment of compulsive exercise that measures the broad range of attitudes and emotions captured within the construct. This would provide further validation to using a self-report inventory for compulsive exercise both within clinical and non-clinical settings.

This study has a number of applied implications. The CET-A may be a useful tool for coaches and sports professionals to detect athletes with elevated levels of eating psychopathology. It may assist sports professionals to decide whether athletes would benefit from further eating disorder assessment and support. The study supports the development of athlete specific education
with regards to maintaining a healthy relationship with exercise, and in helping them to identify when their relationship with exercise may be unhealthy.

Conclusions

This study supports the use of the Compulsive Exercise Test within the sporting context, to support the detection of athletes at an increased risk of eating psychopathology. Identified athletes can be signposted to appropriate education or support, to address their motivations for exercise and to assess their risk of developing an eating disorder. The study has a number of limitations that can be addressed in further research, but it is the first attempt to establish cut-offs on an exercise measure to support the early identification of athletes who are at risk of eating psychopathology. The findings also support the development of athlete-specific education in terms of maintaining a healthy relationship with exercise.
Chapter 5 Links between emotion regulation and eating psychopathology in competitive athletes and non-athletes: The mediating role of compulsive exercise

5.1 Introduction

This is the third quantitative study presented in this thesis. The previous studies have demonstrated the elements of compulsive exercise that are relevant for athlete groups, and clear links with eating psychopathology have been established. A cut-off score on the athlete version of the CET that may assist in identifying athletes with elevated levels of eating psychopathology has been proposed. However, the mechanisms by which compulsive exercise and eating psychopathology are linked in athletes and non-athletes have yet to be explored. The following study aims to explore role of compulsive exercise as a coping mechanism for negative affect. Previous research has proposed compulsive exercise as a dysfunctional method of emotion regulation (Meyer et al., 2011). Goodwin and colleagues (2012) demonstrated associations between compulsive exercise and emotion regulation among adolescent exercisers, suggesting that compulsive exercise may be a method of regulating emotions among this group. In addition, emotions are widely recognised as having an important impact on sports performance (Lane, Beedie, Jones, Uphill & Devonport, 2012). Thus, being able to manage and regulate one’s emotions appropriately is of increasing importance for athletes. However, the interactions between compulsive exercise, emotion regulation and eating psychopathology have yet to be tested empirically among athletes and potential differences in comparison to non-athlete groups have yet to be explored. This study aimed to explore the role of compulsive exercise as a dysfunctional emotion regulation strategy that may mediate the relationship between difficulties with emotion regulation and eating psychopathology in athletes and non-athletes.
5.2 Study 3: Links between emotion regulation and eating psychopathology in competitive athletes and non-athletes: The mediating role of compulsive exercise

The following study is in preparation for submission to the International Journal of Eating Disorders.


**Abstract**

**Objective:** Compulsive exercise has been proposed as one maladaptive strategy of emotion regulation that has been linked with increased eating psychopathology. This study aimed to explore the links between emotion regulation and eating psychopathology among athletes and non-athletes, and to investigate a potential mediating role of compulsive exercise. **Method:** A sample of 499 participants (262 athletes and 237 non-athletes) aged between 18-45 years completed the Eating Disorder Examination Questionnaire (EDE-Q), the athlete version of the Compulsive Exercise Test (CET-A) and Difficulties in Emotion Regulation Scale (DERS). **Results:** The study demonstrated significant associations between DERS scores and CET scores among both non-athletes and athletes alike. CET scores partially mediated the relationship between several DERS subscales and EDE-Q scores among athletes. However, CET scores only partially mediated the relationships between two DERS subscales (Impulse and Acceptance) and EDE-Q scores among non-athletes. **Discussion:** The study suggests that compulsive exercise is a maladaptive emotion regulation strategy that is more commonly utilised among athletes than non-athletes. It suggests that athletes who engage in maladaptive emotion regulation strategies such as compulsive exercise may be at an increased risk of eating psychopathology. The study has implications for educating and supporting athletes in engaging with more functional emotion regulation strategies, as a means of preventing compulsive exercise and potentially eating psychopathology.

**Introduction**

There is evidence to suggest that both clinical and subclinical eating disorders are more common among male and female athletes in comparison to non-athletes (Petric, 1996; Sundgot-Borgen & Torstveit, 2004; Torstveit, Rosenvinge & Sundgot-Borgen, 2008) and that this is the case among both adolescents and adults (Byrne & McLean, 2002; Martinsen & Sundgot-Borgen,
Study 3

2013; Smolak, Murnen & Ruble, 2000). Socio-cultural, environmental and psychological factors have been identified as possible risk factors that contribute towards this increased vulnerability to eating disorders among athletes (Bratland-Sanda & Sundgot-Borgen, 2013).

Emotion regulation is one potential risk factor that has received relatively little attention with regards to the development of eating psychopathology among athletes. Emotion regulation has been defined as the conscious and unconscious ways in which individuals can influence their experience and expression of emotions (Gross, 1998). Theoretical models of emotion regulation have highlighted specific strategies as either adaptive or maladaptive (Aldao, Nolen-Hoeksema & Schweizer, 2010; Gross & John, 2003). Adaptive emotion regulation strategies include cognitive reappraisal (e.g., generating alternative interpretations of stressful situations; Gross & John, 2003) and mindfulness (e.g., acceptance of emotions; Chamber, Gullome & Allen, 2009; Gratz & Roemer, 2004). Maladaptive strategies include suppression, whereby expression of emotions is prevented (Gross, 1998), and experiential avoidance, where a person is unwilling to engage with psychological experiences that they find uncomfortable, and as such takes action to prevent or modify such experiences (Hayes, Wilson, Gifford, Follete & Strosahl, 1996). Maladaptive strategies and difficulties with emotion regulation are associated with a wide range of mental health problems, including depression, anxiety disorders, substance abuse and eating disorders (Berking & Wupperman, 2012).

Indeed, difficulties with emotion regulation have been identified across all levels of eating psychopathology, and are pervasive across diagnostic categories (e.g., Harrison, Sullivan, Tchanturia & Treasure, 2010; Lavender & Anderson, 2010; Svaldi, Griepenstroh, Tuschen-Caffier & Ehring, 2012). The transdiagnostic model of eating disorders (Fairburn, Cooper & Shafran, 2003) suggests that the same core psychopathological processes exist across all diagnostic categories, following observations of shared features and the tendency of patients to migrate from one disorder to another. A difficulty in coping with negative emotions has been identified as an important feature of all clinical and subclinical eating disorders, and the model proposes that eating disorder symptoms (e.g., bingeing and purging) are maladaptive strategies to cope with negative affect (Fairburn et al., 2003). Such behaviours can reduce negative mood and provide a distraction away from unpleasant emotional experiences (Heatherton & Baumeister, 1991; Stice, 1994). Substantial cross-sectional evidence supports the association between deficits in emotion regulation and eating psychopathology (Gilboa-Schechtman, Avnon, Zubery & Jeczmin, 2006; Harrison et al., 2010; Sim & Zeman, 2006). There is also evidence to suggest that difficulties in emotion regulation engender an increased vulnerability to the subsequent development of eating psychopathology (McLaughlin, Hatzenbuehler, Mennin & Nolen-Hoeksema, 2011).

The intensity of experienced emotions and the ability to regulate emotion have also been acknowledged as having a substantial impact on sport performance (e.g., Lane, Beedie, Jones, Uphill & Devonport, 2012; Vallerand & Blanchard, 2000), by influencing athletes’ motivation and
their cognitive and physical functioning (Vallerand & Blanchard, 2000). As such, athletes are encouraged to employ practical strategies to regulate mood, such as cognitive reappraisal, attention deployment and imagery, which may facilitate a more adaptive emotional state (Uphill, McCarthy & Jones, 2009). Comparatively, limited research has explored the potential maladaptive strategies of emotion that are employed by athletes or the consequences of such strategies on athlete health and well-being. One such maladaptive strategy of emotion regulation may be to engage in driven or compulsive exercise (Meyer, Taranis, Goodwin & Haycraft, 2011). Athletes have previously identified exercise as an important coping strategy for mood regulation, particularly for negative emotions (Stevens & Lane, 2001; Terry, Dinsdale, Karageorghis & Lane, 2006).

Compulsive exercise is characterised by rigid perspectives on exercise, with strong motivations for weight and shape control, and has an important mood regulatory function in addition to the cognitive-behavioural components (Bratland-Sanda et al., 2011; Meyer et al., 2011). The positive, mood enhancing benefits of exercise are commonly reported among the population (Berger & Motl, 2000), however among eating disorder patients, exercise more commonly serves to alleviate negative affect (Bratland-Sanda et al., 2010; De Young & Anderson, 2010; Peñas-Lledó, Vaz Leal, & Waller, 2002). Importantly, compulsive exercise is associated with increased levels of eating psychopathology among athletes and exercisers alike (Goodwin, Haycraft, Taranis & Meyer, 2011; Plateau et al., 2014 (Study 1); Taranis, Touyz & Meyer, 2011). In addition, a recent study from Goodwin and colleagues (2012) found a significant association between compulsive exercise and emotion regulation strategies among adolescent exercisers, suggesting that compulsive exercise may provide an emotion regulatory function in this group.

In summary, there is considerable evidence to suggest a link between emotion regulation difficulties and eating psychopathology, but this has yet to be explored in athletes (Gilboa-Schechtman, Avnon, Zubery & Jeczmien, 2006; Harrison et al., 2010; Sim & Zeman, 2006). Previous literature supports the role of compulsive exercise as an emotion regulation strategy (Goodwin et al., 2012), but has also been linked to increased levels of eating psychopathology among athletes and exercisers (Goodwin et al., 2011; Plateau et al., 2014 (Study 1); Taranis et al., 2011). However, it is not yet known whether compulsive exercise is a mood regulatory strategy employed by athletes and whether differences exist in comparison to non-athletes. The first aim of this study was to replicate previous findings among non-athletes of the association between emotion regulation and compulsive exercise (Goodwin et al., 2012), and between compulsive exercise and eating psychopathology (Goodwin et al., 2011; Taranis et al., 2011). The study also aimed to extend the exploration of these links to an athlete sample; it is hypothesised that increased difficulties with emotion regulation among athletes will be associated with higher levels of compulsive exercise and higher levels of eating psychopathology. Finally, the study aimed to explore a potential mediating role for compulsive exercise in the relationship between emotion regulation and eating psychopathology. Given previous literature suggesting exercise as a
potentially maladaptive mood regulatory strategy among athletes, it is anticipated that the relationship between emotion regulation and eating psychopathology will be significantly mediated by levels of compulsive exercise.

**Method**

**Participants**

Following approval from the institutional and NHS ethical advisory committee, a sample of 499 participants (262 athletes, and 237 non-athletes) with a mean age of 22.10 years (range 18 to 45 years, \( SD = 4.39 \)), was recruited. The total sample included 144 males and 355 females. Nearly 90% of the sample (\( n = 447 \)) reported their ethnicity as White British or White (Other), and 92% reported their first language as English.

**Athlete sample**

The majority of the athlete sample (102 males; 160 females) was recruited from sports teams and clubs at British universities. The researcher obtained permission from sports coaches to attend a variety of training sessions to advertise the study. In addition, the study was also advertised over email to members of university sports teams and clubs, with a link to the online study. The inclusion criteria specified that athletes had to be over 18 years of age, competing in one or more sports and to have been doing so for a minimum of six months. The athlete participants in this study also provided data that was included in study 2 (\( n = 262 \)).

Fifteen athletes (13 female, 2 male) currently receiving treatment for an eating disorder were recruited from four eating disorder services in the UK and completed the questionnaires as part of another study (see studies 6 and 7). Clinicians were approached with information about the study, and were asked to pass this on to any current clients who were deemed well enough to take part and who met the inclusion criteria. The participants were asked to report their ED diagnosis, of which seven had a diagnosis of bulimia nervosa, four had a diagnosis of anorexia nervosa, and the remaining four had a diagnosis of eating disorder not otherwise specified (EDNOS). Additionally, six athletes who were recruited through sports clubs reported a previous eating disorder on the demographic questionnaire. Participants with current and previous eating disorders therefore represented 8% of the athlete sample. These participants were included in the final sample to order to ensure a range eating psychopathology was represented. In terms of levels of eating psychopathology, the sample was similar to other athlete samples reported within the literature (Hulley & Hill, 2001; Sundgot-Borgen & Torstveit, 2004).

The athlete sample was relatively evenly split between athletes competing in lean sports (54%, \( n = 141 \)) and non-lean sports (46%, \( n = 121 \)). As classified by Torstveit and Sundgot-Borgen (2005), lean sports include endurance, aesthetic and weight dependent sports, whilst non-lean sports include ball, power and technical sports. Nearly three quarters of the athletes reported
currently having a coach (74%, \( n = 195 \)), with a mean length of involvement in their sport of 7.84 years (\( SD = 4.78 \)). Just under half of the participants (46%, \( n = 120 \)) reported competing at national or international level in their sport, and thus were classified as elite level athletes. A further third of the sample (34%) were classified as sub-elite, as they competed at regional and university level. The remaining 20% of the athlete sample competed at club or county level.

**Non-athlete sample**

Non-athletes were required to not be participating in any competitive sport. The non-athlete sample (\( n = 237; n = 195 \) females) was recruited on an opportunity basis at a UK university and through advertisement at various non-sporting groups and clubs. A small proportion of the sample (\( n = 10 \)) completed the questionnaire for course credit. A small proportion of the non-athlete sample reported an involvement in non-sport-related recreational exercise (22%, \( n = 53 \)). Participants reporting a current or previous eating disorder were retained in the final sample in order to obtain a range of eating psychopathology that reflected the general population (e.g., Favaro, Ferrara & Santonastaso, 2003). Demographic characteristics for the athlete and non-athlete samples are presented in Table 5.1.

Table 5.1 Demographic characteristics of athletes (\( n = 262 \)) and non-athletes (\( n = 237 \)) in the sample

<table>
<thead>
<tr>
<th></th>
<th>Athlete sample</th>
<th>Non-athlete sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean, SD) years</td>
<td>22.21 (5.04)</td>
<td>23.14 (6.86)</td>
</tr>
<tr>
<td>Males (( n, % ))</td>
<td>102 (38.9%)</td>
<td>42 (17.7%)</td>
</tr>
<tr>
<td>Females (( n, % ))</td>
<td>160 (61.1%)</td>
<td>195 (82.3%)</td>
</tr>
<tr>
<td>BMI (Mean, SD) kg/m(^2)</td>
<td>22.21 (2.66)</td>
<td>22.15 (3.47)</td>
</tr>
<tr>
<td>White British (( n, % ))</td>
<td>227 (86.6%)</td>
<td>191 (80.6%)</td>
</tr>
<tr>
<td>Previous eating disorder (( n, % ))</td>
<td>6 (2.3%)</td>
<td>5 (2.1%)</td>
</tr>
<tr>
<td>Current eating disorder (( n, % ))</td>
<td>15 (5.7%)</td>
<td>9 (3.8%)</td>
</tr>
</tbody>
</table>

**Procedure**

Information with regards to the purpose and format of the study was provided to potential participants prior to participation. A paper information sheet was provided by the researcher to those completing the questionnaires by hand, and the same information was available on the first page of the online questionnaire. Participants who completed the paper version had the
opportunity to ask questions directly of the researcher prior to completing the questionnaire. Those who completed the questionnaire online were able to contact the researcher for more information if they had any questions prior to taking part in the study. All of the participants were informed of their right to withdraw from the study at any time. The participants all provided informed consent and completed a demographic questionnaire, prior to completing the following questionnaires in the order presented below.

**Measures**

**Compulsive Exercise Test (Athlete Version; Plateau et al., 2014; Study 1).**

Participants completed the athlete version of the Compulsive Exercise Test (CET-A; Plateau et al., 2014) to assess the participant’s exercise attitudes and behaviours. The Compulsive Exercise Test assesses the multidimensional nature of exercise in the eating disorders, incorporating cognitive and behavioural motives for exercise in addition to weight and shape motives (Taranis, Touyz & Meyer, 2011). Fifteen items from the original self-report measure were deemed suitable for use with competitive athletes (Plateau et al., 2014; Study 1). Therefore the CET-A was considered appropriate for use in this study, to ensure athletes and non-athletes could be compared on a measure that was relevant for both groups. Participants indicate the frequency with which each item is true for them on a six-point Likert scale: 0 (*never true*); 1 (*rarely true*); 2 (*sometimes true*); 3 (*often true*), 4 (*usually true*); 5 (*always true*). Higher scores indicate greater levels of compulsive exercise. The items assess exercise attitudes and behaviours on three subscales, including (a) Avoidance of Negative Affect; (b) Weight Concern Exercise; and (c) Mood Improvement. Example items include: “I feel less anxious after I exercise” (Avoidance of Negative Affect); and “If I cannot exercise, I worry that I will gain weight” (Weight Concern Exercise). In the current sample, Cronbach alpha values were good: Avoidance of Negative Affect = .92, Weight Concern Exercise = .84, Mood Improvement = .81 and Global Score = .90.

**The Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 2008).**

The EDE-Q is a 28-item self-report questionnaire that explores eating attitudes and behaviours over the preceding 28 day period. Participants respond on a 7-point Likert scale from 0 (*No days*) to 6 (*Every day*). Higher scores on the measure are indicative of increased levels of eating psychopathology. The measure is comprised of four subscales, including Restraint, Eating Concern, Shape Concern and Weight Concern. The global score is the mean score of the four subscales. The measure has been found to sufficiently distinguish eating disorder cases and has been deemed valid and reliable in comparison to diagnostic interviews and measures screening for eating disorders (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen & Beumont, 2004, Mond et al., 2008). The EDE-Q has been previously used with athletes to assess eating psychopathology.
Study 3

(Hulley & Hill, 2001; Shanmugam, Jowett & Meyer, 2011; 2014). Current Cronbach alpha values indicated good reliability for the EDE-Q in this study: Restraint = .81; Eating Concern = .84, Shape Concern = .92, Weight Concern = .87 and Global Score = .91.

**Difficulties in Emotion Regulation Scale (DERS, Gratz & Roemer, 2004).**

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item self-report measure that was designed to assess problems with regulating emotion. The measure has six subscales, including (a) *Nonacceptance of emotional responses*; (b) *Difficulties in engaging in goal directed behaviour*; (c) *Impulse control difficulties*; (d) *Lack of emotional awareness*; (e) *Limited access to emotion regulation strategies*; and (f) *Lack of emotional clarity*. An example item is: “When I’m upset, I feel guilty for feeling that way.” Participants are asked to indicate how often each statement applies to themselves, according to a 5-point Likert scale running from 1 (almost never, 0-10%) to 5 (almost always, 91-100%). Higher scores are indicative of greater difficulties with emotion regulation. Research with eating disorder patients has indicated elevated scores on the DERS in comparison to healthy controls (Harrison, Sullivan, Tchanturia & Treasure, 2009; 2010). The measure has been found to have good reliability and validity among nonclinical groups (Gratz & Roemer, 2004; Weinberg & Klonsky, 2009). In this study, Cronbach alpha values were good: (a) Nonacceptance of emotional responses = .91; (b) Difficulties in engaging in goal directed behaviour = .88; (c) Impulse control difficulties = .88; (d) Lack of emotional awareness = .81; (e) Limited access to emotion regulation strategies = .91; (f) Lack of emotional clarity = .86 and (g) Global score = .94.

**Data Analysis**

Inspection of the relevant histograms and Kolmogorov-Smirnov tests indicated significant deviations from normality for all variables. Therefore, non-parametric tests were used where possible. A series of preliminary Mann-Whitney U tests were conducted on EDE-Q, CET and DERS scores to assess whether differences existed on these measures between athletes and non-athletes, and also between males and females. Some significant differences existed between the groups (see Table 5.2 and Table 5.3). Consequently, subsequent analyses were conducted separately for athletes and non-athletes, and gender was included as a covariate in the regression analyses. Two-tailed Spearman’s Rho correlations were conducted between the CET and EDE-Q scores with the DERS to determine which subscales could be included in the mediation analyses. A significance level of $p<0.01$ was adopted for all tests to reduce the incidence of Type I errors.

The suitability of the data for mediation analysis was assessed. The standardised residuals were inspected and were found to be normally distributed, suggesting the data could be analysed using regression analysis (Field, 2005). The data also met assumptions for independence and no collinearity was found within the data (Field, 2005). A series of linear regression analyses were
therefore deemed appropriate to assess the predictive relationship between the three variables. Mediation analyses were conducted to assess whether the relationship between DERS and EDEQ scales were mediated by CET scores, separately for athletes and non-athletes. Mediation analyses were conducted in accordance with Baron and Kenny (1986). The global score on the EDE-Q was used as the dependent variable for all analyses.

Mediation requires four criteria to be met (Baron & Kenny, 1986), which can be tested through three regression analyses (Holmbeck, 1997). These criteria were tested as follows within this study. First, an initial regression analysis tests whether the independent variable (DERS) significantly predicts the dependent variable (EDE-Q). The second regression analysis tests whether the independent variable (DERS) significantly predicts the mediator (CET). If these two regressions are significant, the final two criteria are tested in a third regression, in which the mediator (CET) and the independent variable (DERS) are entered simultaneously as predictors of the dependent variable (EDE-Q). Baron and Kenney’s criteria state that the mediator (CET) must predict the dependent variable (EDE-Q) when controlling for the IV (DERS). The relative effect of the independent variable (DERS) on the dependent variable (EDE-Q), whilst controlling for the mediator (CET), can also be assessed in this final regression, allowing full or partial mediation to be established. If this relationship is no longer significant when controlling for the mediator (CET) full mediation has occurred (Baron & Kenny, 1986). Sobel tests were conducted to assess the significance of partial mediations (Sobel, 1982).

Results

Descriptive statistics for the CET, DERS and EDE-Q scores for athletes and non-athletes, and males and females, as well as the results of Mann Whitney U tests of difference are shown in Table 5.2 and Table 5.3 respectively. The results demonstrated significant differences between athletes and non-athletes on the CET and DERS. Differences between males and females occurred primarily on the measure of eating psychopathology. Two-tailed Spearman’s Rho correlations indicated that significant positive associations existed between the majority of the subscales of the CET and DERS with the EDE-Q subscales for athletes (.20 ≤ r(253) ≤ .75, p ≤ .001 in all cases) and non-athletes (.18 ≤ r(233) ≤ .70, p ≤ .001) alike. The Mood Improvement subscale of the CET and the Awareness subscale of the DERS did not correlate significantly with the EDE-Q for either group so were not included in the mediation analyses. Similarly, significant positive correlations existed between the Avoidance and Weight Control Exercise subscales of the CET with the majority of the DERS subscales for athletes (.20 ≤ r(233) ≤ .47, p ≤ .001) and non-athletes (.18 ≤ r(233) ≤ .33, p ≤ .001) alike. The Mood Improvement subscale did not correlate consistently with the DERS subscales, and the Awareness subscale of the DERS was not associated with any of the CET subscales among athletes and non-athletes.
Therefore, for both athletes and non-athlete groups, mediation analyses were conducted with the DERS Non Acceptance, DERS Goals, DERS Impulse, DERS Strategies, and DERS Clarity as potential predictors, and CET Avoidance and CET Weight Control Exercise as potential mediators, with Global Score of the EDE-Q as the dependent variable.

Table 5.2 Means, standard deviations and Mann Whitney U test of difference scores for CET-A, DERS and EDE-Q scores between athletes ($n = 262$) and non-athletes ($n = 237$).

<table>
<thead>
<tr>
<th></th>
<th>Athlete Mean (SD)</th>
<th>Non-Athlete Mean (SD)</th>
<th>Mann Whitney U (Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CET-A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance of Negative Affect</td>
<td>2.49 (1.19)</td>
<td>1.47 (1.16)</td>
<td><strong>9.24</strong></td>
</tr>
<tr>
<td>Weight Control Exercise</td>
<td>2.42 (1.29)</td>
<td>2.57 (1.29)</td>
<td>1.44</td>
</tr>
<tr>
<td>Mood Improvement</td>
<td>3.51 (.90)</td>
<td>3.02 (1.12)</td>
<td><strong>4.81</strong></td>
</tr>
<tr>
<td>Global Score</td>
<td>2.81 (.86)</td>
<td>2.36 (.95)</td>
<td><strong>5.27</strong></td>
</tr>
<tr>
<td><strong>DERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-acceptance</td>
<td>2.30 (1.03)</td>
<td>2.26 (1.00)</td>
<td>.33</td>
</tr>
<tr>
<td>Goals</td>
<td>14.33 (5.05)</td>
<td>15.11 (4.88)</td>
<td>1.76</td>
</tr>
<tr>
<td>Impulse</td>
<td>11.69 (5.38)</td>
<td>11.62 (4.65)</td>
<td>.66</td>
</tr>
<tr>
<td>Awareness</td>
<td>16.65 (4.41)</td>
<td>15.34 (4.82)</td>
<td><strong>3.46</strong></td>
</tr>
<tr>
<td>Strategies</td>
<td>15.81 (6.74)</td>
<td>17.33 (7.04)</td>
<td><strong>2.63</strong></td>
</tr>
<tr>
<td>Clarity</td>
<td>10.93 (4.02)</td>
<td>10.69 (3.91)</td>
<td>.64</td>
</tr>
<tr>
<td>Global Score</td>
<td>83.40 (23.83)</td>
<td>83.66 (22.33)</td>
<td>.25</td>
</tr>
<tr>
<td><strong>EDE-Q</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restraint</td>
<td>1.58 (1.43)</td>
<td>1.28 (1.35)</td>
<td>2.31</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>.99 (1.34)</td>
<td>.83 (1.11)</td>
<td>.68</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>2.08 (1.73)</td>
<td>2.24 (1.62)</td>
<td>1.44</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>1.69 (1.65)</td>
<td>1.77 (1.52)</td>
<td>1.13</td>
</tr>
<tr>
<td>Global Score</td>
<td>1.58 (1.40)</td>
<td>1.53 (1.25)</td>
<td>.124</td>
</tr>
</tbody>
</table>

**$p \leq .001$; *$p \leq .01$**
Table 5.3 Means, standard deviations and Mann Whitney U test of difference scores for CET-A, DERS and EDE-Q scores between males ($n = 144$) and females ($n = 355$).

<table>
<thead>
<tr>
<th></th>
<th>Males Mean (SD)</th>
<th>Females Mean (SD)</th>
<th>Mann Whitney U (Z score)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CET-A</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance of Negative Affect</td>
<td>2.14 (1.18)</td>
<td>1.96 (1.31)</td>
<td>1.97</td>
</tr>
<tr>
<td>Weight Control Exercise</td>
<td>2.05 (1.20)</td>
<td>2.67 (1.29)</td>
<td>4.89**</td>
</tr>
<tr>
<td>Mood Improvement</td>
<td>3.40 (1.00)</td>
<td>3.23 (1.05)</td>
<td>1.77</td>
</tr>
<tr>
<td>Global Score</td>
<td>2.53 (.87)</td>
<td>2.61 (.96)</td>
<td>.79</td>
</tr>
<tr>
<td><strong>DERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-acceptance</td>
<td>2.13 (.89)</td>
<td>2.34 (1.05)</td>
<td>1.70</td>
</tr>
<tr>
<td>Goals</td>
<td>13.69 (4.40)</td>
<td>15.12 (5.15)</td>
<td>2.77*</td>
</tr>
<tr>
<td>Impulse</td>
<td>10.71 (4.24)</td>
<td>12.05 (5.29)</td>
<td>2.37</td>
</tr>
<tr>
<td>Awareness</td>
<td>16.34 (4.47)</td>
<td>15.90 (4.72)</td>
<td>1.10</td>
</tr>
<tr>
<td>Strategies</td>
<td>15.25 (6.23)</td>
<td>17.06 (7.12)</td>
<td>2.57*</td>
</tr>
<tr>
<td>Clarity</td>
<td>10.15 (3.90)</td>
<td>11.08 (3.97)</td>
<td>2.46</td>
</tr>
<tr>
<td>Global Score</td>
<td>79.05 (20.21)</td>
<td>85.33 (23.96)</td>
<td>2.06</td>
</tr>
<tr>
<td><strong>EDE-Q</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrains</td>
<td>1.29 (1.23)</td>
<td>1.49 (1.46)</td>
<td>1.18</td>
</tr>
<tr>
<td>Eating Concern</td>
<td>.47 (.71)</td>
<td>1.10 (1.35)</td>
<td>4.79**</td>
</tr>
<tr>
<td>Shape Concern</td>
<td>1.49 (1.33)</td>
<td>2.42 (1.73)</td>
<td>5.46**</td>
</tr>
<tr>
<td>Weight Concern</td>
<td>1.11 (1.21)</td>
<td>1.98 (1.65)</td>
<td>5.47**</td>
</tr>
<tr>
<td>Global Score</td>
<td>1.09 (.96)</td>
<td>1.75 (1.41)</td>
<td>4.50**</td>
</tr>
</tbody>
</table>

**$p \leq .001$; *$p \leq .01$**

The mediating role of compulsive exercise in the relationship between emotion regulation and eating psychopathology.

Mediation analyses were only conducted where the data met three criteria (Baron & Kenny, 1986). First, there needed to be a significant relationship between the DERS subscale score and EDE-Q Global score. Second, there needed to be a significant relationship between the DERS subscale score and CET subscale score. Finally, there needed to be a significant relationship between CET subscale scores and EDE-Q Global scores. Gender was included as a co-variate in all regression analysis.
Athletes

_CET Avoidance of Negative Affect as a mediator of the relationship between emotion regulation and eating psychopathology._

Regression analyses were first conducted between the DERS subscales and the EDE-Q Global score. Each regression pathway was tested separately, according to Baron and Kenny (1986). The results are shown in Table 5.4. Each of the DERS subscales included in the analysis independently predicted the EDE-Q global scores. Second, separate regression analyses were conducted between each of the DERS subscales and the CET Avoidance subscale. Each of the separate subscales of the DERS significantly predicted CET Avoidance scores. The final series of regression analyses found that when controlling for each of the separate DERS subscales, CET Avoidance remained a highly significant predictor of EDE-Q Global scores among athletes. However, when controlling for CET Avoidance, each DERS subscale remained significant predictors of EDE-Q Global Score, but with a lower effect than in the second regression, suggesting a partial mediation effect for Avoidance of Negative affect for each of the DERS subscales. The significance of these partial mediations were confirmed through Sobel tests (Sobel, 1982; \( Z \geq 3.80, p \leq .001 \)).

_CET Weight Control Exercise as a mediator of the relationship between emotion regulation and eating psychopathology._

A similar process was conducted for the potential mediator of CET Weight Control Exercise (Table 5.4). At stage two (investigating the predictive relationship between the individual IV and the mediator) the results indicated that the DERS subscales of Goals and Clarity did not significantly predict CET Weight Control Exercise, thus were excluded from further mediation analyses. When controlling for the DERS subscales of Impulse, Strategies and Non-Acceptance, CET Weight Control Exercise remains a significant predictor of EDE-Q global score among athletes (\( \beta \geq .66, p < .001 \)). Finally, when controlling for CET Weight Control Exercise, the DERS subscales (Impulse, Strategies and Non-Acceptance) remained as significant predictors of EDE-Q Global Score (\( \beta \geq .28, \Delta R^2 = .59, p < .001 \)). Sobel tests indicated that CET Weight Control Exercise significantly and partially mediated the relationship between the DERS subscales of Impulse, Strategies and Non-Acceptance and the EDE-Q global score (\( Z \geq 3.34, p \leq 0.001 \)).

In summary, the results of mediation analyses conducted for athletes indicate that the CET Avoidance subscale is a significant partial mediator for all of the DERS subscales and EDE-Q Global score (See Figure 5.1). CET Weight Control Exercise is also a significant partial mediator for the relationship between DERS Impulse, Strategies and Non-Acceptance with EDE-Q Global Score.
Table 5.4 Unstandardised beta coefficients for the mediation models for athletes (n = 262) when controlling for gender.

<table>
<thead>
<tr>
<th>Independent variable (IV)</th>
<th>DERS Non acceptance</th>
<th>DERS Goals</th>
<th>DERS Impulse</th>
<th>DERS Strategies</th>
<th>DERS Clarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediator</td>
<td>Avoidance</td>
<td>Weight</td>
<td>Avoidance</td>
<td>Weight</td>
<td>Avoidance</td>
</tr>
<tr>
<td>EDE-Q</td>
<td>EDE-Q</td>
<td>EDE-Q</td>
<td>EDE-Q</td>
<td>EDE-Q</td>
<td>EDE-Q</td>
</tr>
</tbody>
</table>

Step 1: Regression using the IV to predict the DV (B)
- .67**
- .08**
- .11**
- .10**
- .12**

Step 2: Regression using the IV to predict the mediator (B)
- .49**
- .37**
- .06**
- .05
- .09**
- .06**
- .07**
- .06**
- .08**
- .06

Step 3 (a): Regression using the mediator to predict the DV when controlling for the IV (B)
- .37**
- .66**
- .50**
- .42**
- .68**
- .39**
- .66**
- .48**

(b): Regression using the IV to predict the DV when controlling for the mediator (B)
- .49**
- .43**
- .05**
- .07**
- .07**
- .08**
- .07**
- .08**

$\Delta R^2$
- .37**
- .61**
- .30**
- .33**
- .59**
- .39**
- .61**
- .31**

**p ≤ .001; *p ≤ .01; $\Delta R^2$ – Adjusted R squared; B- Unstandardised Beta
Non-athletes

*CET Avoidance of Negative Affect as a mediator of the relationship between emotion regulation and eating psychopathology.*

A similar process of analysis was then conducted for non-athletes. Each regression was again tested separately (Baron & Kenny, 1986). Each of the DERS subscales significantly predicted both EDE-Q global scores and CET Avoidance scores among non-athletes (Table 5.5). When controlling for the individual DERS subscales, CET Avoidance remained a highly significant predictor of EDE-Q Global scores among non-athletes ($\beta \geq .27$, $p \leq .001$). When controlling for CET Avoidance as a mediator, each of the individual DERS subscales remained significant predictors of EDE-Q Global score ($\beta \geq .20$, $p < .001$). Sobel tests indicated that CET Avoidance was a significant partial mediator of the relationship between the Impulse subscale and the EDE-Q global score ($Z = 3.63$, $p \leq .001$). However, CET Avoidance was not a significant partial mediator for the Non Acceptance, Goals or Clarity subscales among non-athletes, when predicting EDE-Q Global Score.

*CET Weight Control Exercise as a mediator of the relationship between emotion regulation and eating psychopathology.*

Finally, Weight Control Exercise was investigated as a potential mediator between emotion regulation and eating psychopathology among non-athletes (Table 5.5). At stage 2 of the analysis, the DERS subscales of Strategies, Clarity and Goals did not significantly predict CET Weight Control Exercise in non-athletes, hence were excluded from further analysis. When controlling for the DERS subscales of Non Acceptance and Impulse, CET Weight Control Exercise remained a significant predictor of the EDE-Q Global scores among non-athletes ($\beta \geq .55$, $p \leq .001$). When controlling for CET Weight Control Exercise as a mediator, DERS Non Acceptance and Impulse remained significant predictors of EDE-Q Global Score ($\beta \geq .06$, $\Delta R^2 \geq .51$, $p \leq .001$). Sobel tests indicated that CET Weight Control Exercise was a significant partial mediator of the relationship between the DERS subscales of Impulse and Non Acceptance with EDE-Q Global score ($Z \geq 3.42$, $p \leq .001$).

In summary, the results of mediation analyses conducted for non-athletes indicate that both CET Avoidance and Weight Control Exercise are significant partial mediators for the relationship between DERS Impulse and EDE-Q Global Score, whilst Weight Control Exercise also partially mediates the relationship between Non-Acceptance and EDE-Q Global Score.
Table 5.5 Unstandardised beta coefficients for the mediation models for non-athletes ($n = 237$) when controlling for gender

<table>
<thead>
<tr>
<th>Independent variable (IV)</th>
<th>DERS Non acceptance</th>
<th>DERS Goals</th>
<th>DERS Impulse</th>
<th>DERS Strategies</th>
<th>DERS Clarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediator</td>
<td>Avoidance</td>
<td>Weight Control</td>
<td>Avoidance</td>
<td>Weight Control</td>
<td>Avoidance</td>
</tr>
</tbody>
</table>

Step 1: Regression using the IV to predict the DV (B)

- **.53**
- **.07**
- **.12**
- **.08**
- **.11**

Step 2: Regression using the IV to predict the mediator (B)

- **.43**
- **.37**
- **.05**
- **.05**
- **.09**
- **.06**
- **.04**
- **.04**
- **.08**
- **.07**

Step 3 (a): Regression using the mediator to predict the DV when controlling for the IV (B)

- **.30**
- **.55**
- **.38**
- **.29**
- **.56**
- **.33**
- **.35**

(b): Regression using the IV to predict the DV when controlling for the mediator (B)

- **.41**
- **.33**
- **.38**
- **.09**
- **.08**
- **.06**
- **.08**

$\Delta R^2$

- **.29**
- **.51**
- **.24**
- **.30**
- **.53**
- **.31**
- **.26**

**$p \leq 0.001$; $p \leq 0.0$; $\Delta R^2$ – Adjusted R squared; B - Unstandardised Beta**
Figure 5.1 Mediation relationship between DERS subscales and EDE-Q Global Score when controlling for CET Avoidance among athletes

Discussion

This study aimed to firstly replicate previous findings among non-athletes of the association between emotion regulation and compulsive exercise (Goodwin et al., 2012) and between compulsive exercise and eating psychopathology (Goodwin et al., 2011; Taranis et al., 2011). The study aimed to extend the exploration of these associations to an athlete sample. The study also aimed to explore a potential mediating role for compulsive exercise in the relationship between emotion regulation and eating psychopathology. Increased difficulties in emotion regulation were associated with increased levels of eating psychopathology among both athletes and non-athletes. Similarly, increased levels of compulsive exercise were associated with increased eating psychopathology in both athletes and non-athletes. The first hypothesis was therefore accepted. Elements of compulsive exercise significantly, but partially mediated the relationship between emotion regulation and eating psychopathology among both athletes and non-athletes. This suggests that compulsive exercise can explain some, but not all of the relationship between emotion regulation and eating psychopathology. The second hypothesis can therefore be partially accepted.

The relationship between difficulties in emotion regulation and eating psychopathology has been consistently demonstrated among clinical (Harrison et al., 2010, Svaldi et al, 2012) and non-clinical samples (Goodwin et al., 2012; Sim & Zeman, 2006; Whiteside et al., 2007). This study supported these findings, with a significant association occurring between difficulties in emotion regulation and eating psychopathology among non-athletes. The findings also indicated that this association exists among athletes, which has not been previously shown within the literature. The transdiagnostic model of eating disorders (Fairburn et al., 2003), suggests that eating
disorder symptoms are maladaptive strategies that are employed to cope with negative affect. The findings from this study provide support for this model among the athletic population (Shanmugam et al., 2011) and suggest that disordered eating symptoms may be one method of coping with negative emotions among athletes. However, these findings are also surprising, given that athletes are aware of the potential impact that emotion regulation can have on sports performance (Uphill et al., 2009). Indeed, athletes have been found to demonstrate an ability to use appropriate psychological skills such as motivation and emotion control strategies without having had formal training on how to do so (Thomas, Murphy & Hardy, 1999), suggesting a high level of awareness of adaptive emotion regulation strategies. However, the pressure to maintain an appropriate emotional state for performance may engender an increased risk among athletes to adopt strategies for emotion regulation that are maladaptive (Gross & John, 2003). It has been previously suggested that exercise is a favoured method of emotion regulation among both athletes (Stevens & Lane, 2001; Terry et al., 2006) and non-athletes (Thayer, Newman & McClain, 1994) and the findings in this study provide some support for a mediating role of compulsive exercise between emotion regulation and eating psychopathology.

Indeed, compulsive exercise has been previously associated with increased levels of eating psychopathology among athletes (Plateau et al., 2014; Study 1) and exercisers (Goodwin et al., 2011; Taranis et al., 2011). This study replicates and extends these previous findings, by highlighting compulsive exercise as a partial mediator in the relationship between emotion regulation difficulties and eating psychopathology. The results indicated that only the maladaptive motivations for exercise (exercising to avoid negative mood and for weight and shape reasons) could partially account for the association between difficulties in emotion regulation and eating psychopathology. The mood improvement facet of compulsive exercise was not related to either eating psychopathology or difficulties in emotion regulation. In addition, the mediating role of compulsive exercise was found to be more pronounced among athletes in comparison to non-athletes. In particular, exercising to avoid negative affect was found to significantly mediate the relationship between emotion regulation and eating psychopathology for the majority of the DERS subscales among athletes, whereas this was only true for impulse control difficulties among non-athletes. The findings suggest that exercising to avoid negative affect could be a maladaptive strategy commonly adopted by athletes to regulate their emotions, and that such strategies could result in an increased vulnerability to the development of eating psychopathology (McLaughlin et al., 2011). It is plausible to suggest that this may be one mechanism that could explain the highly increased prevalence of clinical and subclinical eating problems in the athlete population (e.g., Sundgot-Borgen & Torstveit, 2004). The inability to cope with negative emotions among athletes could be exacerbated by a tendency to utilise exercise as a coping mechanism, which in turn is related to an increased vulnerability to eating psychopathology (Meyer et al., 2011). Compulsive exercise may serve to suppress or prevent negative emotions among athletes, and may also
function as an aversion strategy; in allowing athletes to avoid engaging with uncomfortable emotional experiences (Gross, 1998). Indeed, utilising exercise to escape from or to avoid negative emotions is commonly reported among those with clinical eating disorders (Bratland-Sanda, et al., 2010; Peñas-Lledó et al., 2002).

Clearly these findings require longitudinal replication to explore how these three important factors interact over time. In addition, it would be important for future research to identify the amount of exercise and sport engaged in by both athletes and non-athletes. It is possible that the non-athlete sample engaged in very little exercise, hence the CET would lack relevance with this group. Future studies should also aim to match athlete and non-athlete groups on demographic characteristics such as age, BMI, gender and ethnicity, as there were some differences between the groups in this sample.

Furthermore, compulsive exercise was only found to be a partial mediator of the relationship between difficulties in emotion regulation and eating psychopathology for both athletes and non-athletes, suggesting that there are other important factors to consider in predicting disordered eating in these groups. Compulsive exercise is unlikely to be the only coping mechanism that both groups employ in managing their emotions (e.g. Thayer et al., 1994; Thomas et al., 1999). An important extension of the study would be to explore adaptive as well as maladaptive methods of emotion regulation in both groups, such as self-talk and the use of imagery (Lane et al., 2012). Similarly, other forms of maladaptive coping mechanisms may also be important to consider. For example, self-harm has been identified as a method of experiential avoidance (Chapman, Gratz & Brown, 2006; Klonsky, 2007), which may be pertinent to athletes who struggle to cope with their emotions. In addition, further investigations into the mediating role of compulsive exercise among athletes from different sport-types and competition levels would also provide a more in-depth understanding as to whether particular athlete groups are particularly vulnerable to employing maladaptive coping strategies for dealing with negative affect.

Finally, the CET has yet to be validated with an interview assessment of compulsive exercise. This is important to establish through further research, to ensure that the CET effectively measures the components within this construct and can accurately identify people with unhealthy exercise beliefs and behaviours.

There are a number of practical implications to consider. The study highlights a concerning association between difficulties in emotion regulation with eating psychopathology among athletes and non-athletes, and a tendency towards maladaptive coping strategies of exercise among athletes in particular. It is suggested that athletes might benefit from educational workshops as to how to manage their emotions effectively, particularly in the competition environment where the pressure to maintain an appropriate emotional state is considerably increased (Honin, 2010; Lane et al., 2012). Coaches and sports professionals may also benefit from educational sessions, which highlight the potential warning signs that athletes are struggling
to manage their emotions. For example, presenting the features of compulsive exercise in addition to other maladaptive coping strategies, and offering strategies for intervention that coaches and professionals can draw upon could potentially facilitate identification and also potentially prevent the future onset of disordered eating.

**Conclusions**

The findings suggest that compulsive exercise may be a maladaptive coping strategy employed by athletes who have difficulties in regulating their emotions, and this may engender an increased vulnerability to disordered eating. Educational programmes to support athletes in developing more adaptive methods to cope with negative affect could be effective in reducing both compulsive exercise and disordered eating behaviours in a group where the prevalence of eating disorders is high.
Part 3: How do coaches currently identify and manage eating problems in athletes?

Part two of this thesis addressed the first broad research question regarding the link between exercise attitudes and eating psychopathology among athletes, and in developing an appropriate measure of compulsive exercise for this group. The findings indicated that a modified Compulsive Exercise Test was suitable for use with athlete groups, and a cut-off was proposed to identify athletes with elevated levels of eating psychopathology. Compulsive exercise has also been identified as a partial mediator for the relationship between difficulties in emotion regulation and eating psychopathology. The CET-A may be suitable for use within the sports context to identify athletes with elevated levels of eating psychopathology.

Part three of this thesis focuses on addressing the second broad research question – ‘How do coaches currently identify and manage eating problems in athletes?’ This part of the thesis adopts a qualitative perspective on eating psychopathology in athletes, and focuses on coach experiences. This is a novel approach to the area of eating disorders in sport, where the athlete perspective has tended to be the primary focus of research. In recognition of the important role that coaches can have in identifying and managing potential eating problems among athletes, studies 4 and 5 explore the experiences and perspectives of track and field coaches. These studies aim to identify the current methods that coaches utilise in identifying potential eating problems, as well as the strategies they employ in promoting treatment seeking and recovery among athletes with disordered eating.
6.1 Introduction

This study is the first qualitative study within this thesis. Part two of the thesis resulted in the development and validation of a tool that can potentially be utilised by coaches and sports professionals in the sports context to identify athletes with elevated levels of eating psychopathology. However, limited literature has focused on how coaches currently identify potential eating problems among their athletes. This is despite assertions that coaches are in an ideal position to facilitate early identification of eating problems in athletes (Selby & Reel, 2011). Indeed, research has demonstrated that coaches experience significant difficulties in identifying features of disordered eating (Nowicka et al., 2013; Sherman et al., 2005). It is not known what features of disordered eating coaches look for and the strategies they employ in identifying potential eating problems among their athletes. This study aims to further our understanding of how coaches identify potential eating problems in athletes, and to discover the challenges they face in doing so.
6.2 Identifying and preventing disordered eating among athletes:  
Perceptions of track and field coaches

The following study has been published in Psychology of Sport and Exercise. Small changes have been made to ensure that the format is in line with the rest of the thesis.


Abstract

Objective: This study aimed to identify the strategies employed by coaches when identifying disordered eating (DE) among track and field athletes. Method: Semi-structured interviews were conducted with eleven track and field coaches, with experience of coaching at national and international level. The interviews were recorded, transcribed verbatim and an inductive thematic analysis was conducted. Results: Track and field coaches reported using physical, social and performance indicators to identify disordered eating in their athletes. Coaches also monitored their athletes’ eating attitudes and behaviours. Weight loss (both observed and objectively monitored) was considered to be a key indicator of disordered eating. Coaches placed a high level of importance on weight for performance, and an “ideal” female athlete body. Previous experiences of detecting disordered eating and a close relationship with the athlete facilitated the identification of disordered eating. Athlete secrecy and masking behaviours, difficulties in communication and coaches’ stereotypical beliefs were found to complicate the identification process. Conclusions: This study highlights the need for additional information, advice and guidance for track and field coaches to improve their knowledge and confidence in identifying disordered eating among their athletes.

Introduction

Nearly 50% of athletes involved in sports that emphasize a lean body shape and low weight, such as track and field, have been reported to present with features of disordered eating (e.g., Byrne & McLean, 2002; Torstveit, Rosenvinge & Sundgot-Borgen, 2008). Personality, interpersonal and psychosocial attributes (including low self-esteem, self-critical perfectionism and associated mental health problems, such as depression), have been implicated as risk factors for disordered eating in both the general population (e.g., Arcelus, Haslam, Farrow & Meyer, 2013) and among athletes (Shanmugam, Jowett & Meyer, 2011). Elements of the sports environment can elevate body awareness and surveillance, notably the requirements to wear revealing sports attire.
(e.g., Greenleaf, 2004; Reel & Gill, 2001), the perceived value of weight for performance (e.g., Krentz & Warschburger, 2013; Martinsen, Bratland-Sanda, Erikkson, & Sundgot-Borgen, 2010) and the subsequent use of pathological weight loss practices (e.g., Dolan et al., 2011; Pettersson, Ekstrom, & Berg, 2012). Similarly, coach attitudes and behaviours, such as making critical comments regarding an athlete’s weight (e.g., Kerr, Berman & De Souza, 2006; Muscat & Long, 2008); implementation of monitoring processes (e.g., Heffner, Ogles, Gold, Marsden & Johnson, 2003; McMahon & Dinan-Thompson, 2011); and a lack of supervision of weight loss strategies (Sundgot-Borgen, 1994) have been implicated in eliciting and exacerbating disordered eating in athletes.

Interpretive biographies, autoethnographical approaches, and life history analyses of athletes with eating disorders are a rich source of information of how coach attitudes, behaviours and comments can elicit eating problems in athletes (Jones, Glintmeyer & McKenzie, 2005; Papathomas & Lavallee, 2010; 2012a). For example, Jones and colleagues describe the experiences of ‘Anne,’ a swimmer whose eating disorder arose after her coach suggested that she should lose weight to improve her performance. The account provides an insight into Anne’s interpretation of, and reaction to the comment, indicating increased body dissatisfaction and shame at not meeting her coach’s expectations, and acute disruption to her athletic identity, within an authoritarian coaching environment.

Coaches have an important role in identifying disordered eating behaviours and attitudes among their athletes (Selby & Reel, 2011), which may be critical in preventing the onset of a clinical eating disorder (e.g., Neumark-Sztainer et al., 2006). Clinical eating disorders present with high mortality and morbidity (Arcelus, Mitchell, Wales & Nielsen, 2011), however, early treatment intervention is associated with a more favorable outcome (Zipfel, Lowe, Reas, Deter & Herzog, 2000). Early detection of eating disorders may be particularly valuable for athletes given the increased risk of injury that occurs with reduced energy availability and bone density (Pollock et al., 2010; Rauh, Nichols, & Barrack, 2010).

Research has attempted to quantify coach knowledge of the early signs of disordered eating in recognition of their role in the early identification of eating problems in athletes (e.g., Sherman, Thompson, Dehass & Wilfert, 2005; Turk, Prentice, Chappell & Shields; 1999). Most experienced coaches working in high risk sports appreciate the impact of disordered eating on health and performance, although one in five still report having never identified an athlete with an eating problem (Sherman et al., 2005). Moreover, coaches lack confidence in their knowledge of the early warning signs (Turk et al., 1999).

Qualitative research within this field has predominantly been conducted from the perspective of the athlete (e.g., Arthur-Cameselle & Baltzell; 2012; Jones et al., 2005; Papathomas & Lavallee 2010; 2012a) with limited research conducted from the perspective of the coach (Nowicka et al., 2013; Sherman et al., 2005). There is a need to understand more fully athletes’
experience of eating disorders (Papathomas & Lavallee, 2012b). However, maintaining an exclusive focus on the individual may perpetuate the poor reputation that has often been attributed to coaches, in relation to their role in eliciting disordered eating in athletes (e.g., Jones et al., 2005; McMahon & Dinan-Thompson, 2011). Previous research has suggested that coaches experience significant difficulties with identifying the symptoms of disordered eating among athletes, often due to the hidden nature of the disorder, and the tendency of athletes to deny the issue (Nowicka et al., 2013; Sherman et al., 2005). However, the strategies coaches employ, their perceptions of their relative success, and the challenges they encounter have yet to be considered within the wider sporting context. In particular, there is a need to explore how coach actions may contribute towards, or reduce elements of the sport environment that can promote disordered eating (e.g., Busanich & McGannon, 2010; Waldron & Krane, 2005).

The current study takes a novel perspective on disordered eating in sport, by considering the experiences of coaches in identifying eating problems in athletes. The subculture of track and field was investigated, as heightened levels of disordered eating have been reported within this population (Byrne & McLean, 2002; Torstveit et al., 2008). Qualitative methods can be used to explore expressive information such as the beliefs, values, feelings and motivations that underlie behaviour, which are not as easily conveyed in quantitative data (Smith, 2008). These beliefs can be then be interpreted within the sporting context (Bhaskar, 1989). The following research questions were therefore explored using qualitative methods: (a) How do coaches identify and determine the potential presence of an eating disorder and how successful do they perceive these approaches to be? (b) What obstacles and facilitators do coaches encounter when identifying disordered eating in athletes? (c) How can coach experiences of identifying disordered eating in athletes inform us about the potential influence of the sociocultural environment of track and field on the development of eating problems in athletes?

**Method**

**Participants**

Eleven track and field coaches participated in the study. Ten of the coaches were male and one coach was female, and were aged between 44 and 69 years (M = 56.40, SD = 6.85). Years of coaching experience ranged from 6 to 45 years (M = 23.60, SD = 12.01), and participants spent between 4 and 14 hours a week coaching (M = 9.82, SD = 4.50). One coach held a United Kingdom Athletics Level 2 coaching qualification, 6 coaches held a Level 3 qualification and 4 coaches were qualified at Level 4.¹ Eight coaches had previously attended coach education sessions on disordered eating. Ten coaches coached distance running events (from 800m to

¹ Level 2 coaches are qualified to coach independently across all running, jumping and throwing disciplines within athletics. Level 3 coaches have shown some specialisation in terms of the coaching they do, such as specialising within running, jumping or throwing. Level 4 coaches have specialised yet further and are classified as specialist coaches for particular events, such as 800m and 1500m.
marathon); one participant was a field event coach. The participants coached athletes of mixed abilities, but all of the coaches reported currently coaching athletes at either national \( (n = 5) \) or international level \( (n = 6) \). Two coaches exclusively coached female athletes. All of the coaches reported encountering disordered eating in athletes during their time coaching. The same sample of participants took part in studies 4 and 5.

**Procedure**

The study received clearance from the institution’s Ethical Advisory Committee. Coaches were recruited through adverts about the study to UK athletics clubs. Participants were also recruited from coach-education workshops. Inclusion criteria specified having coached an athlete with disordered eating and to be currently coaching (minimum of one hour per week). Coaches with prior experience of disordered eating in athletes were recruited to ensure that they could provide reflective personal experiences regarding identification. Most of the interviews were conducted on the telephone \( (n=10) \), facilitating the participation of a geographically dispersed sample. One participant was interviewed in person due to their convenient location. An absence of visual cues for telephone interviewing may result in a loss of nonverbal data and thus compromise rapport (Aquilino, 1994); however evidence has suggested that the number, nature, and depth of responses do not differ across interview modality (Sturges & Hanrahan, 2004). Telephone interviewing also permits greater anonymity than face-to-face interviews, which may be particularly salient when discussing potentially sensitive topics, such as this.

A semi structured interview schedule was developed in consultation with experts from both the eating disorder and sport fields. Coaches were asked to describe their experiences with athletes with disordered eating. The interview schedule is provided in Appendix H. Following informed consent, the interviews were conducted by the same researcher, appropriately trained in interview techniques. The interviews lasted between 43 and 69 minutes (mean = 53.82 minutes) and were transcribed verbatim, ranging from 5,644 - 11,467 words (mean = 8,261 words).

**Data Analysis**

It is necessary to state the epistemological and philosophical position of the researcher to identify and acknowledge their potential influence on the research process (Willig, 2013). It is also important in determining and justifying the choice of methods chosen, the analytical strategy and the interpretation of the findings (Hignett, 2005). A critical realist perspective was adopted; a position which combines transcendental realism and critical naturalism (Bhaskar, 1989). Critical realism allows us to acquire an insight into coach experiences of disordered eating in athletes through their accounts, but also to locate these experiences within the broader subculture of track and field (Bhaskar, 1989). An inductive thematic analysis was selected as an accessible and flexible method. Themes are not restricted by a pre-existing coding framework, and are closely
linked to the data. The data can be richly described and critically interpreted (Braun & Clarke, 2006).

The analysis followed the six-stage process as outlined by Braun and Clarke (2006). Stage one involved familiarization and immersion in the data; this was achieved through the manual transcription of the interviews and multiple readings of the data. Familiarization allowed the researcher to develop an awareness of the depth and diversity of the data, and to begin the more formal process of conceptualization (Ritchie & Spencer, 2002; Smith & Caddick, 2012). The preliminary thoughts about the data from the reflective diary were reviewed and served to guide the early stages of the analysis. The transcribed data was transferred into NVivo 9 (QSR International, 2010). The qualitative data analysis software facilitated coding of the text, whereby salient and interesting features of the data were systematically labeled. The codes were sorted into potential themes, which were not identified solely on their prevalence, but whether they provided an insight into coach experiences of disordered eating in athletes. The themes were repeatedly reviewed to ensure that they accurately reflected the data. The reflective diary was consulted at this stage to allow for the initial thoughts about the data to be reconciled with, and mapped to, the themes that were generated (Appendix J). Finally, data extracts corresponding with appropriate themes were taken from each transcript, enabling the authors to report quotes that accurately reflected the sample.

Discussions took place within the research team during analysis to facilitate reflection on, and exploration of, alternative explanations and interpretations of the data (Smith, 2008). A second experienced qualitative researcher independently coded a sample of the data to stimulate discussion of the generated codes and themes yet further. Extensive disparity in interpretation would have been reflected upon by the first author, who had a unique insider’s perspective and therefore high sensitivity for relevant themes that emerged. In this case, however, subsequent discussions revealed no major disagreements between the two researchers. It is acknowledged that there are alternative methods to ensure the trustworthiness of the data analysis and interpretation (Sparkes & Smith, 2009; Whittemore, Chase & Mandle, 2001), however the process employed here has been widely used and recommended for inductive thematic analysis (Yardley, 2008).

**Results and Discussion**

The results and discussion are presented concurrently, according to the three themes derived from the analysis. The first section presents the methods used by coaches to identify disordered eating in their athletes; the second and third sections present the barriers and facilitators perceived by coaches when identifying disordered eating in athletes. A summary of the themes and subthemes that emerged in the analysis is provided in Table 6.1.
Table 6.1 Summary of themes and subthemes from the thematic analysis

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
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<tr>
<td>Methods of identification in athletes</td>
<td>Physical indicators</td>
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<td></td>
<td>Eating attitudes and behavioural indicators</td>
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<td>Social indicators</td>
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<td>Performance indicators</td>
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<td>Barriers to identifying disordered eating in athletes</td>
<td>Coach difficulties</td>
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<td>Athlete denial</td>
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<td>Communication</td>
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<tr>
<td>Facilitators for identifying disordered eating in athletes</td>
<td>Coach-athlete relationship</td>
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<td>Support from others</td>
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<td>Previous experiences</td>
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**Methods of Identification**

Coaches described identifying disordered eating in their athletes through observing changes in four main areas. There was a focus on *physical indicators*, but *eating attitudes and behaviours, social, and performance indicators* were also salient subthemes.

1. **Physical indicators**

   All of the coaches in the study relied on physical indicators to determine the presence of disordered eating. Weight loss was considered to be a key feature of eating problems, although differences existed in the strategies utilised to detect weight loss, and in coach beliefs about when to monitor weight. A minority of coaches (\( n = 4 \)) endorsed regular weight monitoring of their athletes, and described using objective measures of weight and body composition as a tool to identify the early stages of disordered eating.

   For athletes who are in heavy training, for me it’s important to know where their body composition is going, because it’s very easy to get out of kilter with that. You’re looking leaner because you’re training hard…it’s very easy to miss the fact that they’re not putting enough nutrition in (62 year-old male endurance coach)
Most coaches, however, expressed concern over the impact of weight monitoring, preferring to only introduce objective measures of weight and body composition after having observed physical changes in the athlete. Specific thresholds for body composition and skinfold analysis were utilised to help the coach determine if weight loss was problematic. A 56 year-old male endurance coach stated, “In a male athlete I’m looking for body fat percentages between seven and eleven per cent. Anything less than seven flags up that there may be an issue. In a female, anything less than fifteen per cent is an issue”. Such criteria were not necessarily based on evidence, but on coaching experience. “That’s my observation, you know, the people who do the skinfolds, they have a very woolly statement about it’s all individual and you’ve got to find out what suits you” (53 year-old male endurance coach).

The remaining coaches (n = 4) perceived a close association between observed weight loss and the presence of disordered eating, relying primarily on identifying weight loss through observation. This approach often required a close attention to detail: “I keep an eye on her very closely; because there are sort of tell-tale signs in terms of the sort of fine hair and also her shorts start to get baggy and things like that” (56 year-old male endurance coach).

Weight monitoring strategies are commonplace within the sports environment (Heffner et al., 2003; Kerr et al., 2006), however athletes commonly identify such practices as a trigger for increased body surveillance and disordered eating behaviour (Cosh, Crabb, LeCouteur, & Kettler, 2012; McMahon & Penney, 2012). The coach participants recognized the potential impact of weight monitoring on athletes, yet reported such strategies were necessary for detecting disordered eating. Weight loss can be indicative of food restriction and potentially anorexia nervosa (American Psychiatric Association; 2000), however it is not always a key feature of bulimic-type eating problems where the emphasis is on bingeing and purging and low weight is atypical (Wilson, Fairburn & Agras, 1997). It is plausible to suggest that coaches reliant on identifying weight loss may be overlooking cases where this is not a salient feature, despite an increased prevalence of bulimia nervosa and eating disorders not otherwise specified (EDNOS) among athletes compared to anorexic-type eating problems (Sundgot-Borgen & Torstveit, 2004).

Menstrual dysfunction was noted as a physical indicator of disordered eating among female athletes by nearly half of the coaches (n = 5). Male coaches described substantial difficulties in discussing menstrual function with adolescent female athletes. Information about an athlete’s menstrual status was occasionally sought from parents to avoid an uncomfortable conversation with the athlete, or reported in the athlete’s training diary that the coach could occasionally check. One 44 year-old male endurance coach expressed particular reluctance to be involved in assessing athlete menstrual function, perceiving this to be the responsibility of the athlete and their general practitioner:
I’ve spoken to all of them, sort of the better girls in my group that they should go and see their doctor about when their menstrual cycles are and all of those type of things… I don’t really want to get that involved with the nitty gritty of it all. They’ve got doctors who can advise them.

The discomfort that coaches experienced in discussing menstrual function was noted by the researcher in the reflective diary, after an interview with a 57 year-old male endurance coach. “Conversations about menstrual function caused significant discomfort. Expressed preference to refer athletes to alternative resources, rather than initiate a potentially awkward conversation - suggests a lack of confidence and potentially knowledge?” These findings provide an insight into perceptions of the female body within the subculture of track and field. Taboos around menstruation and issues identified as “female specific” by coaches (e.g. “those type of things”) continue to exist (Kissling, 1999). The above quote indicates a limited interest in addressing any problems (e.g., “nitty gritty”) as well as a silencing of, or deflection of problems away from the track and field environment (e.g., “They’ve got doctors who can advise them.”) It was also only deemed important to impart this information to successful athletes (e.g., “the better girls in my group”). Other coaches suggested the discomfort in discussing these issues was primarily on the part of the athlete: “Some are more open and want to talk about those sorts of issues, and then others aren’t so [open]” (53 year-old male endurance coach). These findings suggest that communication taboos about menstruation are still pervasive within the subculture of track and field (Kissling, 1999).

2. Eating attitudes and behavioural indicators

Just over half of the coaches (n = 6) identified changes to eating attitudes and behaviours as markers of disordered eating. Coaches referred to athlete restriction of food intake, engaging in unusual eating practices and rituals, and purging behaviours such as self-induced vomiting, laxative abuse, or excessive exercise. Where weight loss had been noted, changes to eating behaviour served to verify suspicions of an eating problem, as described by a 57 year-old, male endurance coach:

She’s sort of said things at the restaurant like, to the waiter, oh I don’t feel very hungry, is it possible to have something off the child’s menu, and then has had something off the child’s menu and not eaten it. In my view she was substantially underweight, and anecdotally, I’d heard that she had eating issues.

One coach reported being aware of purging at the training site, however purging behaviours were most commonly reported to coaches by peers or parents. It is possible that the
detection of bulimic-type symptoms is a particular challenge for coaches, perhaps as a result of their focus on identifying weight loss and changes to physical appearance, which is not a key feature of bulimic-type eating disorders (Wilson et al., 1997).

I noticed that when we did a warm up, she would disappear. I was always concerned about that, suddenly I’d notice that she wasn’t with the group... she didn’t say, but she didn’t deny that when she disappeared it was to make herself sick…before a big race because she thought that would help her (69 year-old male endurance coach).

The coaches often attributed changes to an athlete’s eating behaviour to a desire for performance improvement. In some cases, performance improvement was perceived as the only rational explanation for disturbed eating practices. “You’ve got to try and sort of persuade them that actually, it comes a point when being light is not performance enhancing” (57 year-old male endurance coach). The findings indicate underlying coach expectations of athletes to do everything they can to improve their performance, and adapting their body is an appropriate method by which to do so. Dieting for performance reasons is deemed acceptable within the sporting context (Cosh et al., 2012; McMahon & Penney, 2012) and pressure to diet is commonly reported among athletes (Martinsen et al., 2010; Sundgot-Borgen, 1994). Moreover, a desire to be leaner for performance has been found to mediate the relationship between sports specific pressures and disordered eating (Krentz & Warschburger, 2011).

3. Social indicators

Coaches reported seeking help from parents of adolescent athletes to evaluate their eating behaviour, “I suppose a lot of the feedback we got wasn’t directly from her but from her mother” (63 year-old female endurance coach). Two coaches employed more elaborate strategies; by asking peers to report back about an athlete’s eating behaviour. Some of the coaches were hasty to assume the absence of an eating problem where normal eating behaviours were reported. These findings suggest coaches were unwilling to engage with the possibility of an eating problem. One 57 year-old male endurance coach stated:

I actually said to the other girl, hey you know I really don’t like doing this but can you just…she’s saying she’s brought stuff that she is going to eat, she’s saying she’s going to eat it. Tomorrow at breakfast, I’ll sort of say, did she actually eat when you got back to the room last night, and can you keep an eye open and just let me know if she does. And apparently she did do, so the situation wasn’t as bad as I feared it might be.
Just one coach made reference to social withdrawal as indicative of disordered eating; two coaches noted the link between stressful life events and the onset of an eating problem. Mood disturbances were not identified as possible symptoms, despite high levels of coaching experience within the sample. The findings suggest a lack of awareness of the emotional state of athletes, and a lack of knowledge of the association between poor mental health and eating problems (Shanmugam, Jowett & Meyer, 2012). It is plausible that coaches perceive their role as primarily for physical training and performance improvement (Denison, 2007); beliefs that may be mutually reinforced by athletes, with few expectations for coaches to act as a source of emotional support (Wolfenden & Holt, 2005). In order for athletes to feel valued, and a part of the sports environment in which they compete and socialise, it is important for coaches to support their athletes without attached performance contingencies (Reinboth, Duda & Ntoumanis, 2004). Similarly, a controlled coaching environment with few opportunities for athlete autonomy can negatively impact on athlete wellbeing (Felton & Jowett, 2013) and could increase their risk for disordered eating (Shanmugam et al., 2012).

4. Performance indicators

A drop in performance, a failure to make progress in training, and recurrent injuries often prompted concern over an athlete’s eating behaviour, as one 58 year-old, male field events coach disclosed:

It became clear that she wasn’t making any progress and she was actually going backwards. I got concerned about it, spoke to her mother and then discovered that there were issues with eating and refusing to eat and things like this.

Over half of the coaches (n = 6) noted that performance in fact improved in the early stages of weight loss and that it was only later that performance started to falter: “She got to schools international level, and that was one of the problems in that because, you know, in the initial stages of losing weight, it enhanced her performance” (69 year-old male endurance coach). In some cases, coaches identified initial weight loss as appropriate for performance improvement, highlighting the importance assigned to weight for performance, in addition to an increased threshold for concern over weight loss where performance motives existed.

Coaches were motivated to intervene over an eating problem where athlete performance was reduced, although expressed greater reluctance when performance was improving. This finding indicates a tendency towards a performance-centred as opposed to a person-centred coaching style, with limited consideration for the athlete’s health and psychological wellbeing (Biesecker & Martz, 1999). The athlete’s body is perceived as a “machine”, where performance is improved via appropriate training (Johns & Johns, 2000). The responsibility for adapting their
body for performance improvement is clearly located with the athlete, as expressed by a 57 year-old male endurance coach. “She’s just identified a weight that she wants to hit, which she actually thinks will be the most beneficial racing weight for her”. A performance-centred, authoritarian coaching environment has been identified as a trigger for disordered eating behaviour (McMahon & Dinan-Thompson, 2011).

**Barriers to successful identification of disordered eating in athletes**

Three main barriers to the successful identification of disordered eating were identified by the coaches; *coach difficulties, athlete denial and communication*.

1. **Coach difficulties**

Having limited contact with athletes and being a male coach coaching female athletes were factors that complicated the identification of eating problems. Coaches also cited difficulties in distinguishing between athletes whose appearance met their sport-type expectations, such as a lean distance runner, from those with a potential eating problem. Some of the coaches expressed stereotypical expectations about the appearance of someone with an eating disorder; “She’s a chunky girl, well-muscled. So she doesn’t actually look particularly anorexic you know; in the classic sense. She hasn’t got stick thin limbs or anything like that” (56 year-old male endurance coach).

It was clear that coaches expected athletes with eating disorders to have a noticeably low weight appearance; beliefs that were also exposed via their primary focus on detecting weight loss. This issue was also raised in the researcher’s reflective diary. For example, after an interview with a 57 year-old male endurance coach, it was noted: “This coach was easily convinced of the absence of an eating problem, through a lack of noticeable weight loss and no changes to performance. Raises questions about expectations for an ‘eating disordered’ athlete – is low weight critical?” The use of words such as “chunky” imply that the athlete was of an atypical appearance, raising concerns about the comparisons that coaches make between athletes, and their point of reference. It would appear that a lean and slender physique is considered “ideal”. Such perceptions and beliefs could foster an unhealthy training environment if they are made transparent to athletes (Engel et al., 2003). This particular coach’s choice of language in describing the athlete’s appearance as “chunky” suggests a significant lack of awareness of the potential impact of their comments on an athlete’s body esteem and feelings of self-worth. Although weight-related comments by coaches are unlikely to be ill-intentioned, they can increase body awareness and feelings of dissatisfaction, and potentially trigger disordered eating in athletes (Jones et al., 2005; McMahon & Dinan-Thompson 2011). Weight-related comments from coaches can have long lasting effects even after athletes have retired (Jones et al., 2005; McMahon & Penney 2012).
2. Athlete denial

Several coaches reported difficulties in identifying disordered eating due to the efforts made by athletes to conceal the signs and symptoms. Coaches referred to athletes hiding food, wearing baggy clothes, and being untruthful about their eating behaviours.

Very very devious, ‘cos you’ve got to think at that time it was quite cold, so she was wearing tracksuits and loads of gear, so you couldn’t see it. She was hiding what she wasn’t eating from her parents, she was masking things, you know. They found out when Weetabix fell out from under her armpit (56 year-old male endurance coach).

Coaches often described a deterioration in their relationship with the athlete when they suspected disordered eating, marked by significant distrust (e.g., “devious”). Secrecy and concealment are common features of eating disorder presentation (Vandereycken & Van Humbeeck, 2008); and difficulties in disclosing an eating problem extend to the athletic population (Papathomas & Lavallee, 2010). Conveying to coaches their role in facilitating the disclosure of eating problems among athletes (Selby & Reel, 2011) could help to motivate them to preserve communication channels when an eating problem is suspected.

3. Communication

Coaches reported difficulties in discussing food, weight and menstrual function with their athletes. None of the coaches deemed these conversations to be straightforward, but particular difficulties were reported by older, male coaches working with adolescent, female athletes. Coaches suggested these difficulties were primarily due to an unwillingness of athletes to engage in such conversations, although one 54 year-old male endurance coach acknowledged that his own communication skills needed improving.

There’s always a little bit of a communication issue from a male coach to a female athlete. I’m fortunate in that I have an assistant who is a female coach, so I’ve got back up there. I think that message comes across better woman to woman as opposed to man to woman, maybe it’s a bit me in terms of communication…I can probably put my hand up here and say maybe that’s an issue I have to learn to deal with rather better.

Coaches expressed concern about potentially exacerbating disordered eating, particularly where they lacked certainty in the presence of an eating problem. Some coaches preferred to avoid the issue rather than risk aggravating the situation, suggesting a lack of confidence in their ability to appropriately tackle disordered eating among their athletes.
It can be very specific and individual and you don’t know whether you’re saying something which can be disastrous or really hurt someone, because it is something that is difficult to be aware of I think (69 year-old male endurance coach).

Coaches tend to locate the barriers to identifying disordered eating primarily with the athletes themselves, in terms of a failure to disclose, a lack of openness about eating behaviours, and resistance to discussions about food, weight and shape. Few coaches considered their own coaching practice as a potential barrier to identifying disordered eating. Disciplinary processes such as training regimes, body surveillance and monitoring processes within the sporting context can produce disciplined, obedient and docile athletes. As a consequence, athletes may feel unable to disclose any issues or problems (e.g., Denison, 2007, Foucault, 1991; McMahon, Penney & Dinan-Thompson, 2012).

Facilitators for identifying disordered eating in athletes

Three main sub-themes were identified that assisted coaches in identifying disordered eating, including the coach-athlete relationship, support from others and experience.

1. Coach-athlete relationship

An open and trusting coach-athlete relationship assisted coaches in approaching athletes about their concerns and in assessing potential eating problems. Just over half of the coaches (n = 6) felt able to confront athletes about their concerns in a confidential one-to-one setting.

I think most of the athletes that I coach properly, when you’re meeting up every month on a one-to-one, and you’re seeing them almost every day, you get to know them well enough that you hope that in most cases they get to a point where they can chat about it (53 year-old male endurance coach).

Communication is an important component of a successful coach-athlete relationship, (Jowett & Ntoumanis, 2004), enabling the development of shared goals and allowing coaches to react sensitively to individual athletes’ needs (Jowett & Cockerill, 2003). Communication is a principal method through which emotional well-being can be assessed; an area which has been relatively neglected by coaches in this study in comparison to the physical health and performances of athletes. Importantly, a poor quality coach-athlete relationship, characterised by high levels of conflict and low levels of support has been linked to increased levels of athlete eating psychopathology (Shanmugam, Jowett & Meyer, 2014). The findings described here imply in some cases there is a limited provision of emotional support from coaches, with tendencies towards performance-centred coaching styles. This approach could increase body dissatisfaction by
reinforcing perceptions of the athlete body as something malleable to be altered for performance gains (McMahon & Dinan-Thompson, 2011).

2. Support from others

Many of the coaches sought additional information from the athlete’s peers, parents and nutrition and sports science experts to determine the presence of an eating problem, and to secure support for raising the issue with the athlete. “In my view there is a definite partnership between coach, parent and athlete. It’s important I think to involve all three parties in these types of discussions, so the parents have got an awareness as well” (49 year-old male endurance coach). In line with previous findings, the coaches in this study clearly lack confidence in their knowledge and ability to address disordered eating in athletes (Nowicka et al., 2013; Turk et al., 1999). These findings could indicate a low level of engagement with, and dissemination of, coach education on disordered eating within track and field in the UK. For example, one 62 year old male endurance coach endorsed seeking support from various people when approaching an athlete about an eating problem:

I think you’ve got to use absolutely everything now, because I think once people get into this loop, it’s extremely difficult to get out, so you’ve got to use their family, their friends, their school friends if you know them, their running friends…

3. Previous experience

Just under half of the coaches ($n = 5$) reported that prior experience of coaching an athlete with disordered eating was influential in determining their knowledge of the early warning signs and confidence in being able to identify disordered eating among their current group of athletes. A 54 year-old male endurance coach said:

We’re much more confident [about identifying disordered eating] compared to three years ago. The experience of it sort of brings you down to earth and makes you realize that there are problems out there and it’s not just the elite level athletes that seem to come into problems, it can be anybody.

Coaches also referred to an enhanced vigilance for disordered eating symptoms, acknowledging their role in preventing such problems. “With my past experience, I’d hate to think that one of my athletes that I coached went through such a disorder and suffered as a result in terms of their career” (49 year-old male endurance coach). The findings indicate that experiencing disordered eating among athletes can improve coach confidence for future identification of similar issues. Even among elite coaches, not knowing how to approach an athlete or where to seek
support from are significant barriers to intervention (Nowicka et al., 2013). In practical terms, these findings highlight the value of sharing experiences among coaches and for increased coach education provision to improve confidence among coaches in identifying eating problems (Kerr et al., 2006; Nowicka et al., 2013).

**Conclusions**

An inductive thematic analysis, adopting a critical realist perspective was conducted on interviews from eleven track and field coaches to explore the strategies used to identify disordered eating among athletes. Three main themes were identified: *methods of identification, facilitators* and *barriers* to successful identification of disordered eating.

The coaches within this study adopted strategies for identification that contradicted their motivation for prevention. For example, monitoring weight despite accepting the possible impact of these strategies on athletes; increased thresholds for concern over weight loss when it was deemed appropriate for performance, and not taking action when an eating problem was suspected for fear of exacerbating the situation. These contradictions could potentially be due to the importance that coaches placed on weight for performance, and the “ideal” female athlete body, whilst simultaneously recognizing a need to prevent disordered eating. Beliefs about the link between weight and performance have little empirical support (e.g., Sherman, Thompson & Rose, 1996) yet manifest strongly within sports environments, as “taken-for-granted truths” about the female athlete body (Busanich & McGannon, 2010). Athletes are likely to pick up on, and potentially adopt coach beliefs about the link between weight and performance (Engel et al., 2003). These influential cultural discourses are also reflected in the allusions towards menstrual function as abnormal and unwanted among female track and field athletes, and in the lack of communication that exists between coaches and athletes about menstruation.

The majority of the coaches adopted a primarily disciplinary approach to coaching (Denison, 2007; Foucault, 1991), through processes such as body monitoring, characterizing athletes with disordered eating as untrustworthy and locating difficulties in identifying eating problems with athletes themselves. The majority of coaches perceived their role to be primarily focused on physical training and to improve athletic performance, with limited recognition of and communication about the psychological wellbeing of athletes. This coaching style can lead to docile and unmotivated athletes (Denison, 2007) and potentially have a long term effect on athletes’ relationship with food (McMahon et al., 2012).

In addition to education for athletes, this study supports the provision of comprehensive coach education to track and field coaches. An overview of components for inclusion in coach education workshops is shown in Figure 6.1.
In particular, there is a need to address current coach beliefs about the importance of weight for performance, the “ideal” female athlete body, and the primary focus on weight loss as a marker of disordered eating. Examples of case studies of athletes that breach any “taken-for-granted-truths” may encourage coaches to consider an alternative perspective. Coaches may need support to recognize the impact of different coaching styles and should be encouraged to view their role as going beyond physical training. Workshops could include sessions on establishing successful discussion with athletes on topics such as food, weight and shape, and provide training on how to approach an athlete with a suspected eating problem. Coaches may then be more willing to be “first responders” (Selby & Reel, 2011) to eating problems in athletes.

The inclusion of a diverse group of coaches with varying levels of expertise and working with athletes of various ages and levels was not considered to be problematic given the novelty of this research. Further research may consider narrowing the focus to particular coach groups, notably elite level coaches, university coaches and club coaches working with young athletes. This would support the development of targeted coach education, particularly for those working with adolescent athletes.

The coaches in this study were predominantly middle-aged, male and had substantial coaching experience. The sample was considered an accurate reflection of UK coaches, where the majority of qualified coaches are male (Sports Coach UK, 2011). It is possible that the strategies for identifying disordered eating behaviours as outlined within this study are only true of experienced coaches. Eight of the eleven coaches had previously received some coach education on disordered eating; additional research with less experienced coaches would be useful. This study is innovative in that it explores the identification of disordered eating in sport from the perspective of the coach, and can make recommendations for coach and athlete education. This may help to prevent the future development of clinical eating disorders in athletes.
Study 4

Figure 6.1 Recommendations for coach education on disordered eating in athletes

**Components for comprehensive coach education on disordered eating**

**Address the current focus on weight loss as a primary indicator of disordered eating**

Additional education about other forms of eating disorders, such as bulimia nervosa and EDNOS, and their relative prevalence in athletes.

Provide information on alternative signs and symptoms of disordered eating and co-morbid conditions, to improve coach confidence for identifying eating problems.

**Dispel stereotypical sport and eating disorder beliefs;** for example, the relationship between weight and performance, the “ideal” female athlete body, and taboos about menstrual function.

Provide examples of successful athletes who contradict these stereotypical beliefs.

Educate coaches about the sports environment and culture, and the influence of their own beliefs on the attitudes and behaviours of athletes.

**Improve coach confidence in their ability to communicate successfully with athletes;** particularly with regards to topics such as nutrition, weight and disordered eating.

Training on how to approach athletes where disordered eating is suspected.

Emphasise the importance of the coach in the identification process and highlight some of the difficulties experienced by athletes in disclosing such issues.

Reinforce the need to build and develop a trusting coach-athlete relationship to support successful communication.

Coaches with experience of identifying affected athletes should be encouraged to share their experiences with the wider coaching community.
Chapter 7  Responses of track and field coaches with eating problems

7.1 Introduction

This is the second qualitative study within this thesis. Study 4 revealed that coaches rely on observing changes to the physical appearance of athletes to determine the presence of a potential eating problem. Coaches reported several challenges to identification, including athlete secrecy and masking behaviours and difficulties in discussing weight and eating behaviours with their athletes. In addition, there was evidence to suggest that coaches placed a high priority on weight status for performance. The next logical step was to explore how, following identification of a potential eating problem, coaches subsequently manage these problems in their athletes. The same group of coaches participated in both study 4 and 5.

Ensuring athletes with potential eating problems are signposted to appropriate services and support is important, given that the early identification and treatment of eating problems is linked to more positive long term outcomes (Reas, Williamson, Martin & Zucker, 2000; Zipfel, Lowe, Reas, Deter & Herzog, 2000). Indeed, coaches have been identified as an important source of support and encouragement for athletes seeking treatment for disordered eating (Gulliver, Griffiths & Christensen, 2012; Sundgot-Borgen & Torstveit, 2010). This study aimed to further our understanding of the strategies and approaches that coaches take when working with athletes with eating problem, and to explore some of the challenges and barriers they face in doing so.
7.2 Study 5: Responses of track and field coaches to athletes with eating problems

This paper has been accepted for publication in the Scandinavian Journal of Medicine and Science in Sports. Small changes have been made to ensure the format is in line with the rest of the thesis.


Abstract

Objective: This study aimed to explore how track and field coaches respond to athletes with eating problems. Method: Eleven experienced coaches participated in semi-structured interviews exploring their responses to, and challenges faced when, working with athletes with eating problems. Thematic saturation was achieved, and the analysis revealed three themes relating to the strategies employed by coaches. Results: The first theme indicated a supportive approach, where coaches were proactive in seeking support and in reducing training at the early stages of an eating problem. The second theme outlined an avoidant approach, characterised by coach reluctance to be involved in managing eating problems, and a lack of confidence in their knowledge of eating disorders. The third theme involved a confrontational approach, where coaches employed strict rules and engaged in coercion to persuade athletes to seek treatment. All of the coaches reported facing challenges in persuading athletes to seek treatment and were frustrated by a lack of available support. Conclusions: The study highlights the importance of providing resources and support services where coaches can seek advice. Coach education packages can utilise the findings to highlight the strengths and limitations of different coach strategies, and to reinforce the importance of their role in identification and intervention when eating problems in athletes are suspected.

Introduction

Athletes have been identified as a group who are particularly vulnerable to the development of eating disorders, with nearly 20% of elite female and 8% of male athletes meeting clinical criteria (Sundgot-Borgen & Torstveit, 2004). Studies exploring the prevalence rates of eating disorders among track and field athletes are somewhat limited, as a result of small sample sizes, differing diagnostic criteria, varying competitive levels and mixed sport samples (Hausernasb & McNally, 2004; Johnson, Powers & Dick, 1999). The evidence has, however, suggested that athletes competing in sports such as track and field, where a lean physique is deemed advantageous, are at an elevated risk of eating problems (e.g., Torstveit, Rosenvinge &
Specifically, this includes endurance, anti-gravitation, and high intensity events – such as middle distance running – where competitors have been found to be at an increased risk of eating problems (e.g., Sundgot-Borgen & Torstveit, 2010). Furthermore, indicators of insufficient energy intake, such as menstrual disturbances among female athletes (Bennell et al., 1996a), and reduced bone mineral density and/or bone stress injuries, occur at a high incidence within track and field athletes (Duckham et al., 2012; Nattiv, 2000; Pollock et al., 2010).

The high prevalence of eating disorders among athletes has prompted a considerable amount of research into the potential risk factors (e.g., Petrie, Greenleaf, Reel & Carter, 2009; Torstveit et al., 2008). In addition to the more general risk factors for eating disorders (e.g., self-critical perfectionism, low self-esteem and depressive symptoms), coach attitudes and behaviours towards athlete weight have been identified as potential triggers of disordered eating (e.g., Jones, Glintmeyer & McKenzie, 2005; Turk, Prentice, Chappell & Shields, 1999). For example, encouraging athletes to engage in weight-loss strategies, without providing adequate support and guidance for doing so (Sundgot-Borgen, 1994); criticising an athlete’s weight and shape (Goodwin, Arcelus, Marshall, Wicks & Meyer, 2013; Muscat & Long, 2008); engaging in regular weight and nutritional monitoring practices (McMahon & Dinan-Thompson, 2008) and placing a high priority on weight for performance (Jones et al., 2005) are practices that can increase athlete body surveillance and awareness, with the potential for triggering and/or perpetuating the development of disordered eating among vulnerable individuals (e.g., Jones et al., 2005; McMahon, Penney & Dinan-Thompson, 2012). Similarly, athletes who describe a poor quality relationship with their coach, characterized by high levels of conflict and low levels of support, report higher levels of eating psychopathology than those who describe a good relationship (Shanmugam, Jowett & Meyer, 2014).

In contrast to the reported opinion that coaches can elicit eating problems in athletes, coaches have been identified as having an important role in recognizing the signs and symptoms of eating disorders within their athletes (Selby & Reel, 2011). Coaches are acknowledged as an important source of support when working with athletes suffering from disordered eating and also have a role in encouraging treatment seeking (Sundgot-Borgen & Torstveit, 2010). Due to perceived stigma, a lack of mental health literacy and negative previous experiences of help-seeking, athletes are often reluctant to seek mental health support (Gulliver, Griffiths & Christensen, 2012); although encouragement from the coach has been identified as a key motivator for doing so (Gulliver et al., 2012). Specifically, athletes who have recovered from an eating problem have cited intervention by their coach and imposed reductions of training as useful and necessary strategies in promoting help-seeking behaviours and subsequent recovery (Arthur-Cameselle & Baltzell, 2012).
There is evidence to suggest that coaches often lack confidence in both identifying the signs and symptoms of eating problems and in approaching athletes when they suspect a potential eating problem (Sherman, Thompson, DeHass & Wilfert, 2005; Turk et al., 1999). In particular, coaches express concerns about potentially exacerbating an existing eating problem or triggering an eating problem among vulnerable athletes (Plateau, McDermott, Arcelus & Meyer, 2014; Study 4). A recent study conducted with elite coaches in Sweden revealed difficulties in accessing sufficient resources and support, particularly regarding signposting athletes to appropriate support services for recovery (Nowicka, Eli, Ng, Apitzsch & Sundgot-Borgen, 2013). Therefore, it seems that both logistical and internal challenges exist for elite coaches when facilitating and promoting treatment seeking for eating disorders among athletes.

Such challenges remain despite recent increases in the information available for coaches about identification and management of eating problems both within the scientific literature (Selby & Reel, 2011; Thompson & Sherman, 2010) and in specific coaching resources from sport federations (National Collegiate Athletic Association, 2005; UK Sport, 2007). It has been suggested that the translation of eating disorder knowledge into action may be particularly problematic for coaches (Nowicka et al., 2013). Only a small body of research has explored in-depth the challenges that coaches face when working with an affected athlete and their relative involvement in the treatment-seeking process, directly from the perspective of coaches themselves (Sherman et al., 2005; Nowicka et al., 2013). This research has also primarily been done with coaches at the elite level. Support protocols developed by sports federations are often specific to elite athletes; with limited procedures for athletes competing below this level (British Athletics, 2013). Understanding the challenges that face sub-elite coaches may have much wider implications for coach education, particularly with regards to supporting coach intervention and treatment seeking among athletes with eating problems.

The literature has highlighted the importance of the coach in facilitating and supporting treatment seeking among athletes with eating problems, and the field has begun to consider how sports coaches in general handle such a situation. It is probable, however, that individual differences exist both between coaches and across different sporting contexts. Likewise, individual differences have been demonstrated among caregivers of eating disordered individuals (Treasure, Smith & Crane, 2007) and these differences are believed to have a significant impact on the course and outcome of an eating disorder (Schmidt & Treasure, 2010). There is a clear need to explore in depth the emotional reactions, underlying beliefs and management strategies of track and field coaches when faced with an athlete with an eating problem. The following research aims were explored: (a) What strategies do track and field coaches use when responding to an athlete with an eating problem? How do strategies vary between coaches? (b) What are the challenges that coaches face when working with an athlete with an eating problem?
Method

Participants

Eleven UK track and field coaches were recruited to take part in the study. The coaches were aged between 44 and 69 years and ten (91%) were male. All of the coaches reported encountering disordered eating or clinical eating disorders among female athletes during their time coaching; six of the coaches reported currently coaching an athlete with an eating problem. One coach reported having encountered eating problems among male athletes. The participants coached athletes of mixed abilities, including recreational and club level athletes, although all of the coaches reported currently coaching athletes at either national ($n = 5$) or international level ($n = 6$). Two coaches reported currently coaching athletes who were receiving funding support from the national governing body. With regards to their current coaching context, all of the coaches reported that they were coaching voluntarily, with the majority coaching within a local club environment ($n = 8$); the remainder were coaching within a university environment. The characteristics of the coaches, including demographic information and coaching experience are shown in Table 7.1. The same sample of participants took part in studies 4 and 5.

Procedure

Approval to conduct this study was provided by the Ethical Advisory Committee at the host institution prior to data collection. Advertisements and information about the purpose of the study were emailed and/or posted to UK athletics clubs to recruit interested participants who met the inclusion criteria. Participants were also recruited from coach-education workshops. The inclusion criteria specified that coaches needed to have coached an athlete with an eating problem, to ensure that they could reflect on their personal experiences regarding the recovery of the athlete(s) and to discuss any challenges they faced. Participants also had to be currently coaching for a minimum of one hour each week.

Following informed consent, the coaches were either interviewed in person ($n = 1$) or by telephone ($n = 10$), depending on their individual preference. Previous research has suggested that the frequency and depth of responses to interview questions are equivalent, whether interviews are conducted on the telephone or face-to-face (Sturges & Hanrahan, 2004), although it is recognised that it can be more difficult to develop a rapport with the participant on the telephone (Aquilino, 1994). One advantage of telephone interviewing, however, is the greater anonymity it provides in comparison to face-to-face interviews; which may be of particular importance when discussing sensitive topics, such as this. The interviews lasted between 43 and 69 minutes (mean 53.82 minutes) and were recorded and transcribed verbatim with the knowledge and consent of the participants.
A semi structured interview schedule was developed by a team of experts comprising psychologists, eating disorder specialists, and a psychiatrist (see Appendix H). In addition to providing information about their own experiences of managing an athlete with an eating problem, coaches were asked to respond to a two-part scenario outlining a female athlete with eating disorder symptoms (provided in Figure 7.1). All of the interviews were conducted by the same

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2 Level 2 coaches can coach independently across all running, jumping and throwing disciplines within athletics. Level 3 coaches have developed some specialisation such as specialising within running, jumping or throwing. Level 4 coaches have specialised yet further and are classified as specialist coaches for particular events, such as 800m and 1500m.
researcher (the first author), who is an athlete currently competing at international level in track and field. The interviewer possessed valuable contextual knowledge about track and field, which served to facilitate the development of good rapport with the participants, through shared knowledge of the terms used within the training and competition environment.

Figure 7.1 Disordered eating scenario

Disordered eating scenario

Part 1: Sarah is a talented 18 year old female at your club. She works extremely hard both at her university course and in athletics, and has recently expressed a desire to do additional training beyond her current schedule. She says she wants to succeed and will do whatever it takes. Her performances on the track have been good and she has a chance of being selected to compete for the GB Junior team this year. You notice that Sarah has lost weight in the last few weeks and that she has become more rigid about her diet, excluding most carbohydrates.

Part 2: Three months later and Sarah’s performance has dropped considerably. Her weight has continued to fall and she complains of feeling tired a lot. She admits to you that she has not been eating properly and sometimes makes herself sick after mealtimes.

After each part of the scenario, coaches were asked: How comfortable would you feel in tackling these issues? What would you say to the athlete and what advice would you give?

Data analysis

A critical realist position was adopted (Bhaskar, 1989), in acknowledgement that it is possible to acquire an insight into the experiences of coaches and their strategies in working with athletes with eating problems through their own accounts and descriptions of the events. Critical realism also allows the impact of sociocultural and contextual influences on coach perceptions and experiences to be acknowledged (Bhaskar, 1989).

The transcribed interviews were imported into NVivo 9 (QSR, 2010), a qualitative data management tool that facilitates organisation and analysis of the data. An inductive thematic analysis was conducted, with no pre-determined coding framework; the themes were data driven. The analysis was conducted according to the six phases outlined by Braun and Clarke (2006). The first phase involved familiarisation and immersion in the data through manual transcription of the interviews and reading and re-reading through the whole dataset. This process facilitated comprehension of the complexity of the data set (Smith & Caddick, 2012). Initial thoughts about
the data were recorded during this phase, prior to the more formal and systematic stages of coding. These preliminary notes were used to guide the early stages of the analysis. The second phase consisted of systematically labelling salient features of the text within NVivo 9 (QSR, 2010). A list of codes that occurred across the dataset was generated, and related codes were collated together. The third phase involved sorting the codes into relevant and meaningful themes and subthemes. These themes were then reviewed and re-organised to ensure that the data within each theme were appropriately related to that theme. Similarly, the themes were assessed to ensure there was sufficient distinction between the separate themes. Subsequently, the themes were assigned labels that accurately reflected the data. No new themes were found to emerge in the analysis of the final two interviews, so it was deemed that thematic saturation had been reached (Guest, Bunce & Johnson, 2006). Finally, appropriate quotes were selected from each transcript that were deemed to accurately reflect each theme. The analysis was reflexive, in that frequent discussions were held within the research team to discuss the generated themes, and to consider other possible ways of grouping and labelling the data. A sample of the data was independently coded by a second researcher, who had extensive qualitative experience. Discussions were held between the two researchers, revealing no major disagreements in the codes applied to the data sample. The themes were minimally adjusted during discussions to reach consensus.

**Results**

Four main themes were identified. Three themes emerged with regards to responses and strategies reported by coaches when working with athletes with eating problems, while the fourth theme was that of the challenges that they faced in doing so. The initial three themes, labelled according to the types of strategies employed by coaches were: *Supportive, Avoidant* and *Confrontational*. The challenges that coaches faced in dealing with athletes with eating psychopathology included (a) availability and appropriateness of support, and (b) persuading athletes to seek treatment.

**Supportive**

A supportive approach was an important theme to emerge from the data, where some of the coaches described a strategy of seeking appropriate support for the athlete and being proactive in facilitating a swift recovery. A supportive approach was also characterised by a working partnership between the coach and the athlete, whereby coaches felt able to promote treatment seeking, and to moderate training to support and motivate recovery.

1. **Resourcefulness**

An important component of the supportive theme was a resourceful approach to seeking support. Some of the coaches described seeking out the most appropriate form of support available
to them, and a willingness to take a leading role in doing so. For example, a 56 year old university endurance coach stated: “I was really looking for a clinical psychologist. And not only did I want a clinical psychologist, I wanted a clinical psychologist that dealt very, very proactively with eating disorders and disordered eating.” This particular coach goes on to explain how he took the lead in finding and approaching a psychologist when involved in coaching an athlete with an eating problem.

I’m fortunate that I’ve been able to phone up people and say right, I need a contact, this is such and such. So I’ve been able to phone up a sport psychologist I trust a lot and say, I need somebody that knows about eating disorders.

2. Working in partnership

Coaches who had a clear supportive strategy had specific goals to work with the athlete to tackle the eating problem. These coaches described being able to work in partnership with the athlete through establishing and maintaining good communication channels. Regular, open communication with the athlete ensured that the coach was kept up to date with the athlete’s progress, and allowed the coaches to provide emotional support where necessary. Establishing and working towards common goals with an athlete were also described as an important feature of successful recovery. For example, this 52 year old university endurance coach stated:

The way to make it successful is if the athlete and coach feel as if they’re a team, working together towards a goal, whatever that goal may be…if you’re there with them, working together to try and help them to put on weight… It doesn’t work if it becomes somebody saying you must do this or that.

3. Moderating training

A third component of a supportive strategy was to intervene and reduce training in the early stages of an eating problem, reflecting a desire of coaches to protect the health of the athlete and to promote a swift recovery. Indeed, such a strategy was often described as an attempt to motivate athletes to recover through a manipulation of prescribed training amounts. For instance, the quantity of training prescribed was often closely linked to an athlete’s weight, with increases in training permitted with weight gain or weight maintenance, but equally reductions in training enforced where the athletes did not meet agreed weight targets. This process was described by a 63 year old coach club-based endurance coach.

She was doing three short runs a week at home and they were really short, just until we’d made sure she was maintaining her weight and increasing it before we increased anything.
And that was a sort of a carrot to have…but if she didn’t eat enough to give her the energy to do the training then she wouldn’t be coming training the next week. But, it seemed to work.

4. Signposting

A final element identified in the supportive strategies employed by coaches was a proactive approach in seeking support for their athlete. This included a high level of awareness of when to signpost athletes with eating problems to other sources of support as the severity of the problem heightened. Coaches endorsing a supportive strategy often described taking an active role in the early stages, by seeking out potential sources of support, such as searching for information and support online, seeking advice from other coaches or from the welfare officer within their club. In addition, a small number of coaches showed an awareness of when to signpost athletes to more specialist support services. One 52 year old university endurance coach accepted, “When it reaches a certain level, you have to accept as a coach that you’re not going to be able to sort everybody out, and there might be the odd person who needs professional help.”

Avoidant

The second theme to emerge was avoidance, where coaches noticeably lacked a clear strategic approach to dealing with eating problems among athletes. In particular, some coaches demonstrated an unwillingness to deal proactively with a potential eating problem. This manifested as assigning alternative explanations for weight loss, expressing a lack of confidence in their knowledge about eating problems, and perceiving the management of a potential eating problem to fall outside of their role as a coach. Avoidant responses by coaches were most apparent when an eating problem had yet to be formally diagnosed or identified. In some cases, coaches who initially employed avoidant strategies were able to provide a more supportive response once parents or medical professionals were also involved.

1. Denial

A key component of an avoidant strategy was a tendency of some coaches to deny the presence of an eating problem among their athletes. Instead, the coaches preferred to consider alternative explanations for alterations to their athletes eating behaviours and appearance. For instance, observed weight loss among athletes was frequently attributed to alternative factors such as to lifestyle, training habits or other explanations that were perhaps less distressing or concerning for the coaches. In response to the first part of the scenario, a 57 year old university endurance coach stated: “It may well be that someone is losing weight not necessarily because they’ve got an eating disorder, but actually just because they’re not getting organised, it could just be poor time
management.” This could be problematic in delaying access to treatment, and could potentially allow time for the severity of eating psychopathology to escalate.

2. Responsibility

Avoidant responses by coaches were also characterised by an unwillingness to take responsibility for affected athletes, in terms of encouraging and facilitating support seeking and in assisting the recovery process from a training and competition perspective. Instead, coaches demonstrating more avoidant strategies tended to leave this responsibility to parents, medical support or even the athletes themselves. Although coaches should not be expected to take primary responsibility for dealing with an athlete with an eating problem, and should be encouraged to involve other sources of support, coaches employing more avoidant strategies tended to be quite passive in their attitudes towards addressing a potential eating problem. Indeed, in some cases, any involvement in managing athletes with eating problems was perceived to be outside of the ‘remit’ of the role of the voluntary coach and beyond their level of expertise. For example, one 44 year old club-based endurance coach stated:

I’m just an amateur, dabbling, not necessarily in the coaching, but in terms of all these sort of fringe issues, for want of a better description. What I may know, it might be right, it might not be, I don’t know. Sometimes you get to the point where you think I’ve got a full time job, I do this in my spare time; I really don’t need this amount of hassle.

An avoidance of responsibility was also associated with low levels of confidence among coaches in their knowledge of eating psychopathology. In addition, coaches employing more avoidant strategies perceived their relative influence over their athletes as very low, particularly in terms of persuading them to seek treatment or to change their eating behaviours. This low level of confidence among coaches was reflected in their reliance on the actions of other people, notably the athlete’s parents and members of the treatment team to intervene. Indeed, one 58 year old club-based endurance coach suggested that their role in dealing with athletes with eating disorders was minimal:

Well I think my only contribution as a coach is trying to keep things normal for them. But it’s about liaising with parents and seeing, making sure that you can do what they want, what they need to get their child back on course.

In addition, coaches who were unwilling to take a role of responsibility in dealing with athletes with eating problems also described a lack of accessible resources and knowledge of where athletes could seek support. It is plausible that the passive approach characterising avoidant
strategies was exacerbated by a perceived lack of available support for athletes and coaches alike. As a consequence, however, it was noted that as the severity of eating psychopathology escalated beyond where coaches felt capable of dealing with the situation, they were prone to withdrawal, preferring for another coach to intervene, or expressing an unwillingness to continue coaching the athlete. One 57 year old university endurance coach described: “When you get to that [severe] stage, I think people need serious psychiatric support. I mean it sounds really harsh but it’s gone beyond anything that a coach or GP can deal with.”

3. Concern and anxiety over exacerbating the situation

Finally, coaches employing avoidant strategies also described considerable anxiety and concern about doing or saying something that could elicit or exacerbate the severity of the eating problem. This often resulted in a tendency to take no action, or to significantly delay action with regards to the eating problem. Coaches described this strategy as preferable in comparison to tackling the situation directly and potentially risking an unfavourable outcome. For example, one 69 year old club-based endurance coach describes his concerns about approaching athletes when they suspected an eating issue. “If I was stupid enough to say now some of you look a bit underweight to me, I don’t know if you’ve been… you know that would be absolutely disastrous if they were doing something.”

Confrontational

The third emergent theme comprised confrontational responses, typified by coach-athlete battles over the need to seek treatment and in the reduction of training. Coaches employing confrontational approaches often used scare tactics, imposed strict rules and targets for weight or training, and tried to coerce the athletes into seeking treatment.

1. Rules and conditions

Coaches who tended to use confrontational strategies often described imposing a series of rules or regulations with the athlete in order to gauge some control over the recovery process of the athlete. Rules and conditions were often put in place to help the coach determine when to stop an athlete from training, and the coaches seemed to be more comfortable when they knew they had such procedures in place. For example, a 56 year old male, endurance coach stated with regards to the body fat percentages that he imposed for his female athletes:

If then I’m seeing things that I don’t like, such as less than fifteen percent, then we have a you know, a fairly strong conversation about this has to be addressed. This is a safe weight for you and that’s where I want you to be. And I promise you, you will stay at that weight and long term you will run much better than where you are now.
In this particular case, the coach encouraged the athlete to adhere to the set target by using performance improvement as an incentive. It is clear that this particular coach has very strict beliefs on appropriate body fat percentages for athletes. Such a strict approach may be interpreted negatively by athletes, particularly where they fall above his perceived “ideal weight”. As depicted here, and in several other cases, the target weights and body fat percentages that coaches used as determinants of the athlete’s health and ability to continue training, were not advised by medical professionals, but rather developed through their own experience and interpretation, as described by a 52 year old male endurance coach.

If they get under 50 [millimetres] then I see that as quite a red flag. That’s my observation, you know, the people who do the skinfolds don’t seem to come up with any, they have a very woolly statement about its all individual and you know you’ve got to find out what suits you.

One 56 year old male endurance coach described only agreeing to continue to coach an athlete if they adhered to the set rules and conditions that he had laid out, indicating a preference for control over the athlete’s recovery process. The conditions were deemed as non-negotiable, with the penalty for not adhering to the conditions made clear to both the athlete and the parent.

What I’ve said to the parents, is if I do [continue coaching the athlete], it will be conditional on her giving me a public weigh-in. Not a weight that she gives me, but a weight that she, is seen to take supervised by her mum and dad. That would be conditional on me coaching her.

The insistence that the athlete must be supervised at a regular weigh-in indicates that the coach feels unable to trust the athlete to provide a truthful weight reading, and implies that the athlete might attempt to deceive the coach about their relative weight gain.

2. Battles and conflict

Coaches who demonstrated high levels of confrontation in their approach to dealing with athletes with eating problems, described particular difficulties in motivating the athlete to make changes to their training schedule, or in seeking appropriate support. In particular, unwillingness on the part of the athlete to comply with suggestions from the coach was identified as a major source of conflict. Similarly, where coaches described encountering difficulties in resolving conflicts with their athletes, they demonstrated a notable lack confidence in their knowledge of when to stop an athlete from training, and of how to broach the subject of training cessation with the athlete themselves. Confrontational approaches to the reduction of training were often deemed
as unsuccessful. For example, a 62 year old club endurance coach described being pressured by an athlete when he suggested a reduction in their training.

One of them did say, “Well, if you won’t train me, I’ll go and do it myself.” So basically you’re in that sort of catch twenty-two situation, they really need to get a grip of this and stop training, but at the same time, you need them to be under control. If they’re out on their own, you have no idea what’s going on and how much work they’re doing, which can be worse.

In contrast to the Supportive theme, coaches exhibiting high levels of confrontation did not, or did not feel able, to reduce training at an early stage. In some cases, this resulted in an escalation in the severity of the eating problem, prompting parent and occasionally medical intervention. A collective intervention by the coach, parents and medical staff was often conducted to prevent the athlete from training. Importantly, where coaches felt unable to work with the athlete and where the athlete was unwilling to comply with their demands with regards to training cessation and treatment seeking, the outcome was often a termination of the coaching relationship. Such an outcome was often perceived as the only option in helping the athlete to recover. One such decision was described by a 69 year old club based endurance coach.

I had to make a judgement. I’d hate myself if I didn’t say anything and things went wrong, I have to take this chance. She didn’t want to stop, but I did say look, this doesn’t mean I’m not still concerned about you and I will come and see you. And we did, for some time after, not meet up, but you know, if there was a local race down somewhere she would come along to watch and I would make sure I was there to have a word with her and ask about her studies and that sort of thing.

3. Scare tactics

A final characteristic of a more confrontational approach to managing athletes with eating problems was the use of scare tactics to coerce athletes into seeking treatment for their eating problem. A small number of coaches utilised this approach, with scare tactics focusing around the longitudinal implications of an eating problem both in terms of the athlete’s health, and also with regards to their performance. One 56 year old male endurance coach reported using scare tactics around health to persuade athletes to seek support.

You can just keep banging away and say you know, please seek some advice, please go and see a psychologist, please go and see your GP. If you don’t address it you’re going to make yourself very ill. And ultimately, you’re threatening your life if you persist with it.
More commonly, coaches reported using performance related scare tactics to persuade athletes to seek support for their eating problems. This approach was perceived to be effective in instigating change among the athletes. One 52 year old, male endurance coach referred to real-life examples of athletes who had suffered from eating problems and the effect on performance, to encourage athletes to assess their eating behaviours and seek support.

I would highlight the dangers of running when you’re underweight, in terms of long term health, risk of stress fractures, and long term running health… if you want to have a long career in running, you know, you’re playing with fire. There are so many examples in the sport of people who were successful at 17, 18, 19, who because they didn’t look after themselves properly, have finished by the time they’re 20.

**Challenges faced by coaches**

The final pervasive theme that occurred throughout the data was the challenges that coaches faced when working with athletes with eating psychopathology. These included (a) availability and accessibility of appropriate support and (b) persuading athletes to seek help for an eating problem.

1. **Availability and accessibility of support**

   Nearly all of the coaches in the study expressed concerns about the treatment options available for athletes with eating problems, with many suggesting that the usual primary care route was not always appropriate. In particular, coaches expressed frustration at the lack of understanding of the specific needs of athletes by general practitioners, as well as the amount of time it often took to be referred to a specialist within the National Health Service. One 54 year old club-based endurance coach suggested that athletes should be treated more quickly than non-athletes.

   I’d have liked to have understood rather better the process of referral, of getting people into the system and having some kind of back up for sports people – some kind of fast-tracking would have been extremely useful.

   The coaches perceived their athletes to require specialist support and treatment, which may be a reflection of the level of the coaches and their athletes within this study; all of the participants were coaching at national or international level. Despite the concerns that primary care resources lacked specificity when dealing with athletes, most of the coaches felt that general practitioners (GPs) had significantly greater knowledge than themselves with regards to eating psychopathology, and were willing to follow their advice.
In response to their dissatisfaction with the primary care route, six of the 11 coaches described seeking additional support for their athletes outside of the UK National Health Service. Mostly, this involved sourcing support from a nutritionist or dietician to evaluate the athlete’s nutritional status. However, this wasn’t always deemed a success, as described by a 52 year old university endurance coach: “I have sent people to a nutritionist, but a little bit down the road with some of these athletes, and they’ve said well I don’t know that I really got that much out of it.”

Coaches placed a high importance on seeking support from professionals with a specific interest in sport or who regularly worked with athletes, with the expectation that they would recognise the relative importance of sport for the athlete, as well as enabling athletes to relate to and engage with the clinician. Their main concerns seemed to be around the possibility of the athlete being stopped from training by a clinician who did not recognise the relative importance of sport to the athlete. Several of the coaches noted significant difficulties in sourcing such athlete-specific support, both for eating psychopathology and for more general mental health issues. A 54 year old club-based endurance coach noted:

In terms of physical problems then we know local physios we’ve got contact with those, we’ve got a good support network for things like that. But when it’s a mental health issue, there really isn’t anything I know of that I can go to and get any help.

Club based coaches working with sub-elite level athletes described finding and accessing athlete-specific support as a particular problem. A wide variety of support options was perceived to exist for elite level athletes, but this was not the case for athletes not quite at this level. Indeed, coaches noted the considerable financial difficulties for sub-elite athletes in seeking psychological, medical or nutritional support. One 56 year old university endurance coach suggested that coaches working with all levels of athletes should be able to seek specific support through the governing body: “Any old coach should be able to say I’ve got a problem and somebody should be able to pick it up. Now that can’t be done right now.”

2. Persuading athletes to seek treatment

Persuading an athlete to acknowledge they had an eating problem was described as particularly difficult by coaches, especially for adult athletes, where parental involvement was minimal and coaches were unable to call upon them for their support. Similarly, coaches also identified unwillingness among athletes to seek help for eating problems and other mental health issues, which complicated their role in facilitating the athlete’s recovery. Whilst many of the coaches felt able to explain the risks and the importance of seeking support for an eating problem,
motivating the athlete to seek help was identified as the most significant challenge, as one 69-year old club-based endurance coach described:

But that is the hardest part, that is by far the hardest part, as I said, this particular girl I coached, she accepted everything, she understood exactly what I was saying and why and the reasoning behind it, but could not get herself to do it.

**Discussion**

This study explored how track and field coaches respond to athletes with eating problems, and investigated the challenges they encounter when doing so. Three themes emerged of strategies that coaches employ when working with an athlete with an eating problem; Supportive, Avoidant and Confrontational. A fourth theme identified the challenges they faced, such as persuading affected athletes to seek treatment, and a lack of accessibility to support. The findings clearly distinguished between coaches who felt able to manage an athlete with an eating problem, and those who did not. Indeed, some coaches perceived dealing with athletes with eating problems to fall outside of the remit of their role as a coach. A tendency towards supportive strategies was evident where coaches had access to support networks and specialists, and where they felt able to tackle the eating problem in partnership with the athlete.

In contrast, avoidant strategies were characterised by passivity towards dealing with potential eating problems. Parents and medical staff were often relied upon to enforce training cessation or treatment seeking. Medical intervention and support is undoubtedly essential, particularly as the severity of an eating problem escalates; however, where coaches employ avoidant strategies, it is suggested they are failing to capitalise on their advantageous position to identify the early signs of disordered eating and potentially prevent the escalation to a clinical eating disorder (Selby & Reel, 2011). The results indicated that a lack of confidence and available support can prevent coaches from taking decisive action.

Some coaches engaged closely with the treatment seeking process, while others were unwilling to acknowledge it as part of their role. The study explored experiences of voluntary track and field coaches, so these differences are perhaps unsurprising. The findings do however, raise questions as to what can be expected of coaches who work in a sport where eating disorders are prevalent (Sundgot-Borgen & Torstveit, 2010), in terms of identification and signposting. The findings reveal a coaching culture within which the psychological and emotional wellbeing of athletes is relatively neglected, which may contribute to the stigma that athletes perceive in disclosing mental health issues (Gulliver et al., 2012).

In contrast, some coaches who were willing to address potential eating problems adopted a confrontational style that was characterised by strict rules and targets. These targets were often not sanctioned by medical professionals, but were targets that coaches identified as appropriate. It is important to reinforce to coaches the need to seek medical support when assessing the weight
status of athletes, particularly when this is the primary method used to determine if athletes can continue training. Coach beliefs about weight can easily transfer to athletes, reinforcing perceptions about the importance of weight for performance (Engel et al., 2003). Weight monitoring and weight targets can exacerbate disordered eating among athletes and encourage perceptions of an ‘ideal’ body shape for their sport (Jones et al., 2005; McMahon & Dinan-Thompson, 2008).

Supportive strategies were concomitant with a greater coach involvement in the treatment seeking process. Coaches can provide valuable insight into changes in training behaviours, competitive performances, and eating attitudes among athletes with eating problems (Plateau et al., 2014; Study 4); and they are also likely to be instrumental in facilitating the athlete’s transition back into competitive sport after recovery (Thompson & Sherman, 2010). Indeed, this supports the notion that encouraging coaches to remain actively involved during the treatment process, may facilitate the athlete’s recovery and enable communication between the coach and the clinician over the resumption of training (Thompson & Sherman, 2010).

The three response styles that emerged in this study fit well with literature exploring parenting styles (Baumrind, 1967) and responses of carers of people with eating disorders (Treasure et al., 2007). Supportive coach responses can be likened to the Dolphin carer or the Authoritative parent, while an avoidant coach response can be likened to the Permissive parent, and the Ostrich carer. Similarly, confrontational strategic approaches can be likened to the Authoritarian parenting style, and the Rhinoceros carer (Baumrind, 1967; Treasure et al., 2007). Resources for carers have incorporated animal metaphors to facilitate recognition of their own response styles and to promote alternative ways to deal with eating disorders (Treasure et al., 2007). It is suggested that the themes reported in this study are not mutually exclusive, with various factors influencing the strategic approach taken by each coach. Indeed, it is important to note that some of the coaches in this study demonstrated elements of the three themes, suggesting a rather confused approach to managing the eating problem, and lacking a clear strategy. In addition to coach knowledge and experience of disordered eating, factors such as the quality of the coach-athlete relationship, the athlete’s age, and the availability of support services are likely to influence coach responses. It may be useful to incorporate the findings from this study into eating disorders education for coaches, to facilitate recognition of response styles, potential influencing factors, and the strengths and limitations of each strategy.

The coaches experienced difficulties in persuading athletes to seek help for an eating problem; an issue that has also been identified by elite level coaches (Nowicka et al., 2013). Athletes are often reluctant to seek mental health support due to concerns over the associated stigma (Gulliver et al., 2012). In addition, clinical studies have indicated that patients can perceive the benefits of retaining an eating disorder to outweigh those of recovery (e.g., Nordbo et al., 2012).
Exploring the potential benefits that athletes attribute to retaining an eating problem is therefore an important line of enquiry, specifically to inform the development of athlete-specific interventions. This study has important implications as to how UK track and field coaches can be better assisted in supporting athletes with eating problems. It highlights the importance of providing resources, local contacts and governing body endorsed protocols to improve coach confidence and encourage them to address potential eating problems at an early stage. Importantly, early intervention for eating disorders is associated with a more positive treatment outcome (Reas, Williamson, Martin & Zucker, 2000; Zipfel, Lowe, Reas, Deter & Herzog, 2000). It is necessary to reinforce with coaches the key role that they play in identifying and facilitating the recovery of athletes (Plateau et al., 2014 (Study 4); Selby & Reel, 2011).

This study included a small sample of track and field, highly experienced, older male coaches. The majority of qualified, volunteer coaches are male (Sports Coach UK, 2011), hence the sample closely reflects the UK coaching demographic. The findings are consistent with results from elite coaches (Nowicka et al., 2013), suggesting that difficulties experienced in accessing support and persuading athletes to seek treatment are pervasive regardless of sport or level of coaching. This exploratory study can inform the development of a quantitative measure of coach responses when faced with athletes with eating problems. It is plausible to suggest that the strategic approaches identified in this study may differentiate coach responses in other challenging situations, beyond eating problems. Future research exploring and mapping the relative success of coach strategies through assessing help-seeking behaviour among athletes will further validate the strategies identified in this study.

**Conclusions**

Athletes are at an increased risk of eating problems, and coaches are in an advantageous position to identify and intervene. This study is innovative in exploring eating problems in track and field athletes from the perspective of the volunteer coach. The findings have important implications for coach education, highlighting the need to empower coaches in their early intervention role. Coaches can be encouraged to identify their individual responses to athletes with eating problems, and to acknowledge the advantages and limitations of such strategies. This study highlights the need to provide sufficient support for coaches to enable them to facilitate the recovery process. Training and competition can then be appropriately reintroduced in collaboration with the clinical team.
Part 4: How do athletes experience eating disorders?

Part three assessed the second broad research question of this thesis, with regards to the current methods of identification and management of eating problems in athletes that are used by coaches. A novel perspective on eating psychopathology in athletes was adopted, by considering the perspective of the coach. Despite coaches being in an ideal position with regards to identification and potential intervention for eating psychopathology in athletes (Selby & Reel, 2011) it was evident that there is a need for additional support and resources in order for coaches to engage with this role. There is also a need to provide further education to dispel some of the sport and eating disorder stereotypes that can prevent successful identification of potential eating problems, but can also contribute towards a sporting environment that can exacerbate eating problems.

The final part of the thesis aimed to address the third broad research question posed within the literature review – ‘How do athletes experience eating disorders?’ Studies 6 and 7 therefore explore the “patient journey” from the perspective of the athlete, from the initial stages of disclosing a potential eating problem, through seeking treatment, and finally their experiences of receiving and engaging with a treatment programme. Athlete experiences of treatment and recovery have been relatively neglected within the eating disorders in sport literature. These studies aimed to improve our understanding of the cultural and individual factors that can prevent or encourage athletes to disclose potential eating problems, and explored some of the challenges they face within the treatment context.
Chapter 8  Disclosure experiences of athletes with eating disorders

8.1 Introduction

This chapter adopts a qualitative perspective in investigating the experiences of athletes with clinical eating disorders. Experiential research within eating disorders in athletes has focused primarily on the antecedents and risk factors for eating disorder development and maintenance, with very little attention devoted to the athlete’s journey through the disclosure and treatment seeking processes. As a consequence, as yet there is limited understanding as to the challenges that athletes face in disclosing potential eating problems, and in seeking support either within or outside of the sporting context. It is important to ensure that athletes with potential eating disorders are identified at the earliest possible stage, to ensure that they can be signposted to appropriate support pathways, and to prevent the potential development of a clinical eating disorder, where the prognosis is less positive. Therefore, this study explored athlete experiences of disclosing an eating problem, in order to improve our understanding of some of the pertinent issues that athletes face in this process, which can subsequently be addressed within the sporting context.
8.2 Study 6: Disclosure experiences of athletes with eating disorders

The following study has been submitted for publication in the Journal of Sport and Exercise Psychology.


**Abstract**

**Objective:** This study aimed to explore the experiences of athletes when disclosing their eating problems. **Method:** Fifteen athletes currently receiving treatment for an eating disorder took part in a semi-structured interview. **Results:** The findings of the Interpretive Phenomenological Analysis revealed that athletes who voluntarily disclosed their eating problems were motivated to recover, placed a high value on their sports performance and demonstrated a strong athletic identity. Athletes who were prompted to disclose endorsed a lack of knowledge and empathy from those who approached them. Barriers to disclosure included fears of exclusion from sport; losing a perceived performance advantage; and losing an important emotional coping mechanism. **Conclusions:** The findings highlight that individual differences exist among athletes in the perceived value of disclosing eating problems. Coaches have an important role in facilitating positive disclosure experiences and signposting athletes into support services.

**Introduction**

Athletes are at an increased risk of both clinical and subclinical eating disorders (see Bratland-Sanda & Sundgot-Borgen, 2013, for a recent review). This has been shown for both male and female athletes across a variety of groups and ages, including: adolescent athletes, (Martinsen & Sundgot-Borgen, 2013); collegiate athletes (Greenleaf, Petrie, Carter & Reel, 2009); elite athletes (Sundgot-Borgen & Torstveit, 2004) and dancers (Arcelus, Witcomb & Mitchell, 2013). A vast proportion of the literature has focused on identifying potential risk factors and correlates of eating psychopathology among athletes. Consequently, questions still remain with regards to the patient journey (i.e., stages of disclosure and help seeking) among athletes with eating disorders. Indeed, Papathomas and Lavallee (2012) called for a greater emphasis on interpretive methodologies, which adopt an alternative perspective by considering the lived experiences and perceptions of the individual. Critics have suggested that risk factor and prevalence research places the responsibility for the eating disorder with the individual, through locating possible causes of eating problems in terms of personality characteristics or a pre-existing vulnerability (Botha, 2009; Busanich & McGannon, 2010). This individual focus may serve to increase athletes’
negative self-perceptions, and thus potentially perpetuate the condition or demotivate athletes when it comes to engaging with the recovery process (Papathomas & Lavallee, 2012). Alternative interpretive approaches can offer novel insights into the issues that are pertinent to individual athletes and encourage a broader, in depth exploration of the experiences of eating disorders in sport, which may improve our understanding of the unique challenges this population face in disclosing and seeking support for an eating problem (Papathomas & Lavallee, 2012).

When eating disorders are detected early and sufferers receive treatment promptly, the prognosis is relatively favourable (e.g., Zipfel, Lowe, Reas, Deter & Herzog, 2000). In reality, there can be a delay of up to ten years between the onset of symptoms and initial treatment contact (Cachelin, Rebeck, Viesel, & Striegel-Moore, 2001). Moreover, these delays are often associated with poor treatment outcomes (Reas, Williamson, Martin & Zucker, 2000). There are many factors influencing patient access to treatment, but acknowledgement and disclosure of an eating problem may be considered the first step (Gilbert et al., 2012). Indeed, patient access to help and specialist services can be significantly quicker where disclosure is initiated by another person, in comparison to those who voluntarily disclose their eating problems (Gilbert et al., 2012). Gilbert and colleagues (2012) also revealed that disclosure is commonly directed to those closest to the individual, such as a mother or close friend. Within the sporting context, an individual’s coach fulfils an important role in facilitating the disclosure of mental health problems (Gulliver, Griffiths & Christensen, 2012), and specifically eating disorders (Arthur-Cameselle & Baltzell, 2012; Selby & Reel, 2011).

The disclosure of mental health problems is a significant source of anxiety among the general population (e.g., Rickwood, Deane, Wilson & Ciarrochi, 2005). Likewise, athletes are often reluctant to disclose or seek support for a mental health problem, due to concerns over associated stigma, poor understanding of their condition, a lack of availability of services, or previous negative experiences of mental health support (Gulliver et al., 2012). Specifically, athletes have identified disclosing an eating disorder as a significant source of anxiety, due to concerns over being removed from their sport, and feelings of shame and distress over the impact of the disorder on their athletic identity (Papathomas & Lavallee, 2006; 2010).

In summary, research with athletes has tended to focus on identifying risk factors and those vulnerable to developing of eating problems, and questions still remain with regards to athlete experiences and perceptions of the patient journey. Disclosure of an eating problem has been identified as an important stage of the recovery process, and as a key process in facilitating access to treatment and support. The perceptions and experiences of disclosure among athletes have yet to be explored in the context of facilitating treatment access and help seeking. Indeed, research thus far has primarily been conducted with athletes with subclinical eating disorders, or with those who have recovered (e.g., Arthur-Cameselle & Baltzell, 2012; Papathomas & Lavallee, 2006; 2010). This study therefore aimed to explore in-depth athlete experiences of first disclosing...
an eating disorder using an interpretive methodological approach. There were three research aims: (i) How do athletes experience disclosure of an eating disorder? (ii) What motivates athletes to disclose an eating disorder? (iii) What barriers do athletes perceive in disclosing an eating disorder?

**Method**

**Participants**

Participants were recruited from UK National Health Service (NHS) inpatient and outpatient specialist eating disorder services. The inclusion criteria stated that participants must be currently undergoing treatment for an eating disorder. Participants had to have a history of training for and competing in sport, and to have been working with a coach; this ensured participants were athletes rather than recreational exercisers. Finally, participants had to be over 18 years old, with English as their first language.

A total of twenty athletes registered their interest in the study and were sent further information; fifteen athletes took part. The participants were receiving treatment either on an inpatient ward (n = 1), in day care (n = 3), or as an outpatient (n = 11). Thirteen of the participants were female, and two were male, which is reflective of the demographic seeking treatment for eating disorders (e.g., Hart, Granillo, Jorm & Paxton, 2011). Participants provided details of their current eating disorder diagnosis; seven participants reported currently having a diagnosis of bulimia nervosa (BN), four reported a diagnosis of anorexia nervosa (AN) and four reported a diagnosis of EDNOS. Nine athletes reported receiving inpatient care over the course of their disorder. Participants were aged between 18 and 47 years (M = 25.05, SD = 9.23), and their BMI ranged between 14.45 and 26.81 kg/m² (M = 19.88, SD = 3.37); median values split by reported diagnosis are given in Table 8.1. Thirteen (87%) athletes identified themselves as White British.

Seven participants reported currently being involved in sports-specific training. The remaining participants had either retired from competitive sport (n = 2), or had been prevented from engaging in sport as a condition of their treatment programme (n = 6). Nine of the 15 participants competed in lean sports such as triathlon, endurance running, figure skating, and gymnastics. The remaining six participants competed in non-lean sports, including football, hockey, badminton and throwing events. Nine participants were classified as “Elite”, as they reported competing at national or international level in their sport; a further three were classified as “Sub-Elite”, as they were competing at university level. The remaining participants (n = 6) reported competing for their club. Table 8.1 provides median values for athletes’ current and previous involvement in sport. The same sample of athletes took part in studies 6 and 7. The athletes also provided questionnaire data that was utilised in studies 2 and 3.
Table 8.1 Demographic characteristics by self-reported eating disorder diagnosis ($n = 15$)

<table>
<thead>
<tr>
<th></th>
<th>Median (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AN ($n = 4$)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>21.08 (11.13)</td>
</tr>
<tr>
<td>BMI (kg/m$^2$)</td>
<td>16.51 (2.61)</td>
</tr>
<tr>
<td>Length of eating disorder symptoms (yrs)</td>
<td>6.12 (10.69)</td>
</tr>
<tr>
<td>Time since first treatment contact (yrs)</td>
<td>4.08 (3.13)</td>
</tr>
<tr>
<td>Length of involvement in sports-specific training (yrs)</td>
<td>10.09 (3.75)</td>
</tr>
<tr>
<td>Hours of exercise per week (hrs)</td>
<td>10.50 (8.60)</td>
</tr>
</tbody>
</table>

Procedure

The study received clearance from both the UK National Health Service (NHS) and the University Ethical Advisory Committees. Participants were recruited from four NHS eating disorder support services in the UK, through liaison with clinicians based at each service. The clinicians facilitated the identification of eligible clients and passed on information about the study to interested individuals, who were then able to contact the researcher directly.

Participants provided informed consent prior to taking part in the study. Participants completed a brief questionnaire and took part in a semi structured interview. The interview schedule was developed through consultation with the existing literature, and in collaboration with experts from both the eating disorder and sport fields. The interview explored how and when disclosure of their eating disorder occurred, and their perspectives of this experience. Interviews took place in the service where participants were accessing treatment, and were conducted by the same researcher, lasting between 28 and 112 minutes ($M = 64.60$ mins).

The interviewer was an athlete competing at a high level in track and field, and possessed good knowledge of the sports environment and context. This supported the development of good rapport between the interviewer and the participant, and presented a valuable insider’s perspective to the sporting environment (Douglas & Carless, 2012). The interviewer consulted two highly experienced eating disorder clinicians for advice during the study. The clinicians supported a debriefing process after each interview to allow the interviewer to discuss any troubling disclosures made by participants. This ensured any concerns were raised promptly with a qualified medical professional.
Measures

Participants completed the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008) prior to the interview. The EDE-Q is a 28-item self-report questionnaire that assesses eating attitudes and behaviours in the preceding 28 days. It is based on the gold standard interview, the Eating Disorders Examination (Fairburn & Cooper, 1993). The measure is scored on a 7-point Likert scale from 0 “No days” to 6 “Every day”; higher scores indicate greater levels of disturbance. The EDE-Q has four subscales: Restraint, Eating Concern, Shape Concern and Weight Concern. The measure has good reliability and validity (Mond, Hay, Rodger, Owen & Beumont, 2004).

Data Analysis

Descriptive statistics were computed for the EDE-Q. An interpretive methodological approach was deemed appropriate as it offers rich data and thus allows a more in-depth understanding of athletes’ eating disorder experiences (Jones, Glintmeyer & McKenzie, 2005; Papathomas & Lavallee, 2006; 2010). Interpretive Phenomenological Analysis (IPA) was deemed an appropriate and flexible tool that can facilitate a rich description and understanding of the ‘lived experience’ (Conrad, 1987). The researcher’s role is one of interpretation and critical questioning, to further facilitate an understanding of participants’ experiences (Smith & Osborn, 2008). In line with the theoretical roots of Interpretative Phenomenological Analysis (IPA; Smith, 1996), the authors adopted a critical realist perspective (Bhaskar, 1989).

The analysis was guided by the procedures outlined by Smith and Osborn (2008). Transcription of the interviews and multiple readings of each transcript facilitated data familiarization. The transcripts were analyzed individually in sequence. Each transcript was annotated to provide summaries of the data and to highlight potential themes and any relationships between them. Themes were identified according to whether they provided an insight into athlete experiences when disclosing an eating disorder; these themes were then listed for each interview. Additional connections between the themes were explored and emerging superordinate concepts were identified. Earlier processed transcripts guided the analysis of subsequent transcripts; similarly the earlier transcripts were continually reviewed for any new themes that emerged subsequently. The superordinate themes and subthemes were finalised once all of the interviews had been analyzed and themes could be confirmed across the dataset. Data extracts that closely reflected the themes were identified for inclusion in the final manuscript. To support the validity of the analysis and to further stimulate discussion and interpretation of the identified themes, a second researcher analyzed three of the interviews, independently identifying superordinate concepts and subthemes. On discussion, it emerged that the identified themes were very similar across the two researchers, with no major disagreements identified.
Results

The mean global score for the sample on the Eating Disorder Examination Questionnaire (EDE-Q) was 3.35 (SD = 1.36). The mean subscale scores ranged from 2.67 (SD = 1.40) for Restraint, up to 4.07 (SD = 1.55) for Weight Concern. EDE-Q scores were lower than those reported in non-athlete clinical populations (Welch, Birgegard, Parling & Ghaderi, 2011), but higher than those reported among non-clinical athlete populations (Hulley & Hill, 2001; Shanmugam, Jowett & Meyer, 2012).

IPA revealed two superordinate themes: Self-initiated disclosure and Facilitated disclosure (Table 8.2). Six participants reported voluntarily disclosing their eating problems; the remaining nine athletes were prompted by a parent, friend, coach or clinician. A variety of motives for disclosure or non-disclosure were reported. Self-initiated disclosure experiences and Facilitated disclosure experiences are presented separately in the results.

Table 8.2 Superordinate themes and subthemes of disclosure experiences among athletes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
</tr>
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<tbody>
<tr>
<td>Self-initiated</td>
<td>Performance motives</td>
</tr>
<tr>
<td></td>
<td>• Explanation for performance decreases</td>
</tr>
<tr>
<td></td>
<td>• Maintaining athletic identity</td>
</tr>
<tr>
<td></td>
<td>Recovery motives</td>
</tr>
<tr>
<td></td>
<td>• Need for support from others</td>
</tr>
<tr>
<td></td>
<td>• Identifying &amp; preventing disordered eating behaviours</td>
</tr>
<tr>
<td></td>
<td>• Facilitating treatment</td>
</tr>
<tr>
<td></td>
<td>• Support from coach, family and friends</td>
</tr>
<tr>
<td></td>
<td>Negative disclosure experiences</td>
</tr>
<tr>
<td></td>
<td>• Lack of knowledge, understanding and empathy</td>
</tr>
<tr>
<td></td>
<td>• Type of approach (eating &amp; weight versus performance)</td>
</tr>
<tr>
<td></td>
<td>• Prompt for treatment seeking</td>
</tr>
<tr>
<td>Facilitated disclosure</td>
<td>Barriers to disclosure</td>
</tr>
<tr>
<td></td>
<td>• Readiness to change</td>
</tr>
<tr>
<td></td>
<td>• Anxiety about removal from sport (stigma, financial issues)</td>
</tr>
<tr>
<td></td>
<td>• Perceived performance advantages</td>
</tr>
</tbody>
</table>
Self-initiated disclosure

Six athletes voluntarily disclosed an eating problem; five reported a diagnosis of bulimia nervosa (BN) and one reported a diagnosis of EDNOS. The median age of these athletes was 21.80 years (range 20 to 47 years; $SD = 11.13$) and the median BMI was 19.34kg/m$^2$ (range 14.45 to 22.70; $SD = 2.96$). The median length of their eating disorder symptoms was 6.05 years (range 2 to 30 years; $SD = 9.14$). The majority of these athletes were competing in non-lean sports ($n = 4$) and competed at an elite level ($n = 4$). Disclosure was directed to a friend or partner ($n = 2$), a general practitioner ($n = 1$) or a coach ($n = 3$); all of the athletes informed their coach of their eating disorder at some stage. Three subthemes were identified: Performance Motives, Recovery Motives and Facilitating Treatment.

1. Performance motives

The process of voluntary disclosure was largely perceived as positive, albeit retrospectively. The majority of these athletes described being motivated to disclose to provide an explanation for their reduced sport performance. Informing their coach was an important step in providing a suitable context for their performance.

I actually went to him and I said I need to speak to you, and I went to talk to him about it. He was like a little bit shocked when I finally told him but I just said to him, I wanted to tell you because I want you to know that’s why my form was dipping and that’s why sometimes I’m not concentrating (22 year old female athlete; EDNOS).

These athletes tended to place a high level of importance on their athletic performance and demonstrated a strong athletic identity, despite often being unable to train or compete. This group of athletes often felt able to be open with their coach about their eating issues, as opposed to disclosing to family members. “I didn’t feel comfortable telling my family, so he was the only person outside of my family that I could really tell and speak to about it” (20 year old female athlete; BN). However, these athletes also perceived high expectations from their coaches, peers and themselves about what constituted a “good athlete” and the behaviours that were consistent with an athletic identity. Disordered eating was identified as incongruent with this identity, and this contradiction often prompted disclosure to a coach or friend. One athlete revealed highly perfectionistic beliefs of how she ought to behave.

I pride myself on being athletic and being good at what I do and if I’m not behaving like I should or not looking after myself in the way I should, then if I get out of shape, I’m not that athlete that I think I am... I find that hard to deal with (20 year-old female athlete; BN).
2. Recovery motives

The athletes who voluntarily disclosed their eating problem identified this revelation as an important step for facilitating their recovery.

I’ve been really open about it ever since the beginning. I haven’t tried to hide it because I don’t really see the point because then no-one will be able to help you and no-one will be able to understand it and stuff (20 year old female athlete; BN).

These athletes were pragmatic about their need for support, and recognized that non-disclosure was a hindrance to their performance and recovery. Disclosure was perceived to limit their opportunities to engage in disordered eating behaviours, by increasing others’ awareness of the signs and symptoms, such as binge eating and compulsive exercise behaviours. “I sometimes think God, I’m too open with people, but I just think it’s easier that way, ‘cos the more people that know about it, the harder it is for me to get away with it” (21 year old female athlete; BN). Disclosure allowed athletes to make their friends and coach aware of the triggers for their disordered cognitions or behaviours. For example, one athlete found it difficult to cope when she competed poorly, and ensuring her peers were aware of this was important in elucidating increased support on those occasions.

If I play badly that’s sometimes a trigger to maybe make me binge or something and it’s in those environments that it can be quite fragile, I feel quite vulnerable. So I sort of asked certain people around me to sort of help me and you know just make sure I don’t be silly or anything (20 year old female; BN).

Voluntary disclosure was rarely described as straightforward, despite these athletes being motivated to recover and wanting to return to their sport. Prior to disclosure, these athletes often noted an awareness of an escalation in severity of their eating disorder, and struggling to cope. For example, one athlete reported increasing levels of depression and desperation, which prompted her disclosure to her coach.

I don’t know what prompted me to tell my coach, but I think I was getting more like teary throughout the day and my mood was getting really low, and I just had to. I just said like can I speak to you and he said yeah (20 year-old female; BN).

3. Facilitating treatment

Self-initiated disclosure experiences were retrospectively perceived as positive and productive, despite some distress occurring on disclosure. The majority of the athletes described
experiencing a supportive reaction from the person they disclosed to, and were often directed to sources of support. For example, one participant described how disclosing to her friend prompted her to seek treatment. “I went to see my GP and that was because I confided in a friend about what was happening with my food and that I’d started with the bulimia” (35 year-old female; BN). Similarly, another athlete described receiving support after disclosing to her coach.

He had a look on websites and that with me and said yeah, you’ve got to go to your GP. And then I went and I got put on a waiting list to see someone, and it kind of like, I got more support after that, like CBT (20 year-old female; BN).

Although the athletes were keen to disclose to their coaches for performance reasons, their subsequent expectations of their coach were often relatively minimal. In many cases, simply informing their coach was sufficient and athletes felt able to seek treatment independently or with support from their family. “It’s difficult because there is only so much other people can do. You have to do it yourself and I’d rather actually…people can’t do it for you. So there’s no point trying to make them do it for you (20 year-old female; BN). All of the athletes reported that their coach reacted positively and supportively.

I don’t really know how I wanted him to react, I thought that he would be like disappointed. I think that’s why I didn’t want to tell people sooner as well, like I’d let them down… But he understood like really well (20 year-old female; BN).

**Facilitated disclosure**

The remaining nine participants described disclosure experiences where they were prompted by someone else; in the majority of cases athletes were asked about their weight loss. Of the nine athletes who described facilitated disclosure experiences, four had a diagnosis of anorexia nervosa (AN), three had a diagnosis of EDNOS and two had a diagnosis of BN. This group of athletes had a median age of 21.08 years (range 18 to 44 years; \(SD = 8.03\)) and median BMI of 20.53 kg/m\(^2\) (14.67 to 26.81; \(SD = 3.58\)). The median length of their eating disorder symptoms was 4.95 years (0.50 to 30 years; \(SD = 10.61\)). Most of these athletes were competing in lean sports \((n = 7)\) and over half were competing at an elite level \((n = 5)\). Athletes who experienced facilitated disclosure of an eating problem were initially approached by a parent \((n = 3)\), a medical professional \((n = 2)\) their coach \((n = 2)\), or a friend \((n = 1)\). One athlete experienced a simultaneous approach from her coach and a doctor. Some of the athletes experienced negative disclosure events and were initially resistant to acknowledging their eating problem. Several barriers to disclosure were identified, including the possibility of being prevented from training, and the loss of an
emotional coping mechanism. Two subthemes were identified: *Negative disclosure experiences* and *Barriers to disclosure*.

1. **Negative disclosure experiences**
The athletes were approached by a variety of individuals, namely parents, coaches, peers and medical professionals. Only two athletes admitted to an eating disorder at the point of approach, one of whom was approached by a friend, and the other was approached by her coach. The remaining athletes fervently denied it. Several athletes suggested they could have been approached more tactfully to facilitate a more positive disclosure experience. For example, one athlete described feeling forced to admit that she had an eating disorder.

One of my friends, who was friends with my housemate, she just basically like pinned me down and got it out of me. I mean I’m glad she did but she took it the wrong way…As soon as they knew about it, they were constantly watching me…they started to try and force me to eat (22 year-old female; BN).

Despite the negative disclosure experience that this athlete describes, in retrospect she refers to being *glad* that they did challenge her about her eating behaviours. Even when disclosure experiences were negatively evaluated, most of the athletes acknowledged a need for intervention and subsequent disclosure of their eating disorder. Negative appraisal of a facilitated disclosure experience was common where athletes perceived a lack of understanding among those who approached them. For example, one participant felt that her coach could have been more empathetic and allowed her to express how she was feeling.

I think he could be more supportive to talk about what I’m feeling at the time. He didn’t really understand what bulimia was…he just wasn’t aware of the facts really and how it would affect me. At the time he could have supported me more; instead of rushing forward he could have saved me the trouble of feeling the way I did by telling me what he thinks and take into account what I thought (18 year-old female; BN).

In contrast, the athletes also highlighted aspects of facilitated disclosure that were experienced positively. For example, one athlete described a disclosure experience that was framed around performance improvement, rather than on her weight. The coach and doctor who facilitated the approach avoided explicitly suggesting the athlete had an eating disorder.
Of course when you start accusing someone of having a problem, that’s when they get defensive. But to suggest seeing a nutritionist, and kind of make the reasons positive, so to make me stronger and better, then that was a kind of way in (22 year-old female; BN).

2. Barriers to disclosure

The athletes reported a number of concerns about disclosing an eating disorder. Several athletes expressed fears of being prevented from continuing with their sport, and concerns of losing financial support and their competitive edge. In addition, some athletes were anxious about deterioration in their relationship with their coach, and were worried about not meeting their own or others’ expectations. It was evident that these athletes perceived the consequences of disclosure to outweigh the benefits of seeking support, even when this was at the detriment of their health and wellbeing. One athlete felt unable to disclose her eating problems due to fears of being removed from her sport.

I think I was scared that they’d [parents] pull me out of the sport if they knew… I couldn’t tell my coach because I was scared he’d stop coaching me, and I wouldn’t tell my federation because I was scared that they’d stop funding me…Like if I’d spoken up I was scared competitors might find out and then think they’d got the upper hand on me and that’s my weakness, and I was labelled the girl with the problem (22 year-old female; BN).

Where participants felt unable to disclose their eating disorder themselves, it was clear that they were hopeful that someone else would ask them about their eating habits and behaviours. For example, one athlete described the conflict of being unable to disclose due to fears of being withdrawn from the team, combined with an intense desire for support. The eating disorder was only identified when he collapsed and was taken to hospital.

If you go to them and admit that you’ve got a problem, he’s just going to say right, you’re off the squad. And that, you can’t do it…The amount of times out of my eyes I sort of looked at him and said, I want help, but you just couldn’t do it. It makes me go goose-pimply just thinking about it now (44 year-old male; AN).

A final barrier identified was the athlete’s own readiness to change and acceptance of their eating disorder. Several athletes reported feeling unable to acknowledge their eating disorder when they were initially prompted. One the other hand, a small number of athletes recognized that they had an issue, but were not sufficiently motivated to relinquish their eating disorder. The eating disorder was perceived to have an important role in helping them to function and cope with their emotions, which was valued above recovery and performance. For example, one female athlete...
described how she was not motivated to attend treatment sessions because her eating disorder helped her to function. “I knew that I had to go to these appointments, because I didn't want to still have bulimia, but other times I really needed it, ‘cos I just relied on it so much” (20 year-old female; BN). Similarly, another athlete was motivated to retain her eating disorder for performance enhancement reasons: “I got in my head this thing that if I wanted to be good again, then I needed to be thin and I needed to have my eating disorder” (22 year-old female; BN).

Although the athletes reported negative aspects of facilitated disclosure, with hindsight many of them admitted that they may not have sought treatment otherwise. These experiences often marked the start of the treatment seeking process. Athletes who experienced facilitated disclosure were uncertain about disclosure and subsequent help seeking, but knowing that someone was concerned about them was comforting.

It was nice having someone to look out for me, ‘cos I knew it was getting to be a problem. There was two parts of me, one wanted to carry on, and didn't want to lose control sort of thing, but the other side of me did actually want to stop and get better. But I suppose it’s at that stage when you don't really know what you want yet. It’s like two sides fighting (21 year-old female; AN).

Discussion

This study aimed to explore the experiences of athletes when first disclosing an eating problem. The findings indicated that six athletes voluntarily disclosed an eating problem, and nine athletes were prompted by a coach, friend, parent or medical professional. Voluntary disclosure was most commonly directed to a friend or coach, and occurred where athletes were highly motivated to recover, and placed a high value on their performance. Athletes who were prompted about their eating behaviours described a lack of understanding and empathy from the person who approached them. Prompted athletes perceived several barriers to disclosure, which outweighed the potential benefits of seeking support. In particular, athletes were concerned about being removed from their sport. Retaining an eating disorder was perceived to confer advantages for performance and as an emotional coping mechanism.

The findings from this study are consistent with the limited existing literature with regards to athlete concerns about disclosing an eating disorder, and the barriers they perceive in doing so (Arthur-Cameselle & Baltzell, 2012; Papathomas & Lavallee, 2006; 2010). Athletes in this study expressed substantial concerns about being removed from sport, which is consistent with findings from recovered athletes and those with subclinical eating disorders (Arthur-Cameselle & Baltzell, 2012; Papathomas & Lavallee, 2010). The findings are supported by previous research indicating that disclosure is more common to individuals outside of the immediate family (e.g., Becker,
Notably, the coach was a key target for voluntary disclosure, but also often approached athletes with suspected eating disorders (Arthur-Cameselle & Baltzell, 2012; Selby & Reel, 2011).

The findings revealed athlete-specific reasons for resistance to disclosing their eating problem. Athletes clearly evaluated the pros and cons of disclosure; the balance of which varied across the sample. Some athletes placed a high value on their sporting performance, which motivated them to disclose their eating problem. Indeed, sports performance has previously been identified as an important factor for motivating recovery (Arthur-Cameselle & Quatromoni, 2014). Other athletes expressed ambivalence towards the value of disclosure – instead, retaining their eating problem was perceived to be more valuable, either for emotional control, or for a performance advantage. Ambivalence towards recovery is a common among eating disorder patients (Cockell, Geller & Linden, 2003) and this study highlights reasons for ambivalence that are specific to athletes.

Similarly, readiness to change is an important predictor of treatment outcome among eating disorder patients (e.g., Bewell & Carter, 2008; Geller, Zaitsoff, & Srikaneswaran, 2005). It is plausible to suggest that where athletes place a high priority on weight for performance, this will impact on their motivation to relinquish their eating disorder. The findings suggest that athletes are exposed to a sporting culture that emphasizes an ‘ideal’ body in athletic performance (Busanich & McGannon, 2010). One-third of the sample competed in non-lean sports where the risk for eating disorders is considerably reduced (Sundgot-Borgen & Torstveit, 2004); yet concerns about weight were pervasive across the participants. These persistent culture discourses and the impact on athlete perceptions of their body should be highlighted in athlete and coach education.

The majority of athletes who voluntarily disclosed an eating disorder had a current diagnosis of bulimia nervosa. Detecting bulimia nervosa is often difficult for onlookers, as weight is usually within the normal range and appearance is not atypical (Wilson, Fairburn & Agras, 1997). Indeed, study 4 revealed that coaches rely heavily on overt markers of weight-loss to identify disordered eating among athletes, which will make identifying athletes with bulimic or atypical eating disorders very difficult. Indeed, coaches also described being more inclined to intervene where the athlete’s weight is visibly reduced (study 4). In this current study, all of the athletes who reported a diagnosis of anorexia nervosa experienced facilitated disclosure, which is consistent with these previous findings of coach intervention.

Notably, athletes in this study who voluntarily disclosed their eating problem had experienced their symptoms for longer than for those who experienced facilitated disclosure. It is highly plausible that voluntary disclosure may occur among athletes who have had more time to acknowledge their eating disorder, and who are more motivated to recover. Facilitated disclosure may be more likely to occur among athletes with anorexic type symptoms, whereby weight is visibly reduced and coaches feel more confident about intervening. These findings suggest that
coaches may need further training to improve their knowledge and confidence in identifying eating disorders beyond the anorexic-type eating disorders, characterized primarily by weight loss.

Previous research has indicated that facilitated disclosure is more effective in ensuring faster access to treatment (Gilbert et al., 2012). However, it is clear from this study that the manner and strategy utilized when approaching athletes with suspected eating disorders is also important. Facilitated disclosure in this study was rarely experienced positively, with athletes describing reluctance to relinquish their eating disorder. This is a commonly presenting feature in eating disorder patients and a significant predictor of treatment outcome (Bewell & Carter, 2008; Geller et al., 2005). It is also important to note that negative appraisals of facilitated disclosure experiences have been linked to longer latencies between disclosure and treatment seeking among non-athletes (Gilbert et al., 2012).

It is important to acknowledge the limitations of this study. The sample was highly heterogeneous with respect to the type of treatment they were receiving, the sport they played, their eating disorder diagnosis, and their stages of recovery. Two participants had retired from competitive sport, while six were not currently training due to requirements of their treatment programme. It is possible that perspectives on the disclosure experience change as a result of undergoing treatment and not actively engaging in sport. The participants also self-reported their eating disorder diagnosis. In any attempt at replication, clinician validated diagnoses would be more reliable and enable the inclusion of diagnostic subtypes. Further research should explore where and how athletes seek treatment subsequent to the disclosure event. However, this is the first known study to explore disclosure experiences among athletes receiving treatment. Novel findings emerged with regards to ambivalence towards disclosure in this group and the study makes important recommendations for coach education.

Conclusions

This study highlights the need to emphasize to coaches the importance of their role in approaching athletes with suspected eating problems (Selby & Reel, 2011). Athletes identified a lack of knowledge and empathy as features of negative disclosure experiences, whereas framing the benefits of recovery in the context of sporting performance was more positive. Techniques on how to approach athletes can be included within coach education workshops. For example, it may be useful to introduce the principles of motivational enhancement within coach education workshops. Finally, athlete perspectives on disclosure can be incorporated into evidence-based guidelines for coaches and practitioners to enable coaches and sports professionals to obtain a more in-depth understanding of athlete perspectives and experiences.
Chapter 9  Athletes with eating disorders: Experiences of seeking and receiving treatment

9.1 Introduction

This is the second qualitative study within part four of the thesis, and it continues to explore the experiences of athletes with clinical eating disorders as part of the third broad research question. The previous study revealed differences between athletes who voluntarily disclosed their eating problems, and those who were prompted to disclose by others. Athletes who voluntarily disclosed were motivated to recover, placed a higher value on their sports performance and demonstrated a stronger athletic identity. In addition, athletes who were prompted to disclose by others highlighted a lack of knowledge and empathy from those who approached them. The next stage of the athlete patient journey is to explore their experiences of seeking and receiving treatment. Research has yet to explore the relative efficacy of psychological therapies for eating disorders in athletes, which is likely to be due to challenges with small numbers of athletes within patient populations. However, the experiential element of treatment among athletes with eating disorders has also been neglected. It is important to understand how athletes perceive and experience the treatment environment, to establish whether athletes face similar issues to non-athletes within treatment, or whether there are some sports-specific challenges that it might be useful for clinicians, coaches and sports professionals to be aware of. Such research will improve our understanding of the athlete experience of seeking and receiving treatment for an eating disorder, which may be relevant for treatment practice and delivery with athlete patients.
9.2 Study 7: Athletes with eating disorders: Experiences of seeking and receiving treatment

The following study has been submitted for publication in the International Journal of Eating Disorders.


**Abstract**

**Objective**: This study aimed to explore the experiences of athletes receiving clinical treatment for an eating disorder. **Method**: Semi-structured interviews exploring experiences of treatment and recovery were conducted with fifteen athletes currently undergoing treatment for an eating disorder at one of four specialist UK eating disorder services. Interviews were transcribed verbatim and analysed using Interpretative Phenomenological Analysis (IPA). **Results**: Three superordinate themes emerged: *Challenges to seeking treatment; Motivation to engage with treatment; and The impact of exercise on recovery.* Athletes encountered practical and psychological challenges in seeking treatment. Once receiving treatment, they described lacking motivation to engage with their treatment, due to concerns that the intervention was not relevant to them. Athletes described feeling frustrated that their athletic identity was not acknowledged. The transition into and out of treatment was identified as a difficult time, particularly with regards to imposed restrictions on exercise behaviours. **Conclusions**: This is the first known study to explore experiences among athletes who are currently receiving treatment for an eating disorder. With limited knowledge of treatment efficacy among this group, this research takes an important step in identifying aspects of treatment programmes that may hinder or facilitate recovery. Athletes share the commonly held view that they require a treatment specifically tailored to them. Therefore, clinicians and therapists might seek to involve athletes closely in the development of treatment goals and targets.

**Introduction**

Athletes are a group at a significantly increased risk of developing eating disorders (Bratland-Sanda, & Sundgot-Borgen, 2013; Byrne & McLean, 2001). Indeed, clinical eating disorders affect up to one in five female, and one in twelve male elite athletes (Sundgot-Borgen & Torstveit, 2004). Much research in this area has focused on establishing eating disorder incidence rates across different athlete groups (Hausenblas & McNally, 2004; Torstveit, Rosenvinge & Sundgot-Borgen, 2008), and in identifying additional risk factors that can increase vulnerability to eating disorders among athletes (Forsberg & Lock, 2006; Smolak, Murnen & Ruble, 2000).
Despite the established incidence of eating disorders among athletes, prevalence and risk factor research has been favoured over qualitative research exploring the experiences of these individuals (Papathomas & Lavallee, 2012). Identifying athletes who are most vulnerable to the development of eating disorders has been deemed necessary to ensure resources for prevention and intervention efforts are directed appropriately (Striegel-Moore & Bulik, 2007). This is without doubt a crucial first step. However, there are currently no evidence-based treatments that have been specifically designed for, or have been tested with athlete groups. This is despite the pervasive perception that athletes require customised attention when it comes to mental health issues, by sports practitioners, athletes and coaches alike (Arthur-Cameselle & Quatromoni, 2014; Hughes & Leavey, 2012; Plateau, McDermott, Arcelus & Meyer, 2014 (Study 4); Schwenk, 2000). Similar to other eating disorder patients (De la Rie, Noordenos, Donker & Van Furth, 2006; Federici & Kaplan, 2008), athletes are reported to frequently feel misunderstood within the treatment environment (Sherman & Thompson, 2001); a factor which is likely to hinder their progress towards recovery (Espindola & Blay, 2009).

Despite the provision of a number of resources and guidelines for professionals working with athletes with eating disorders (Bratland-Sanda & Sundgot-Borgen, 2013; Bonci et al., 2008; Thompson & Sherman, 2010; UK Sport, 2007), there is limited relevant literature for coaches working with athletes at lower competitive levels. Recent exploratory research has indicated that a lack of availability of specific information and support is a major concern for coaches (Plateau et al., 2014; Study 4). Additionally, such guidelines tend to adopt the perspective of the coach or practitioner (Bonci et al., 2008; Thompson & Sherman, 2010; UK Sport, 2007) with limited insight into athlete perspectives on seeking and receiving treatment, and few resources available for athletes themselves (B-eat, 2011).

Indeed, research exploring the individual experiences of athletes could offer an important insight into how athletes themselves experience treatment, and help to improve our understanding of the challenges athletes face in seeking treatment and recovering from an eating disorder. It is likely that some of the factors affecting treatment appraisal among non-athletes will also be relevant for athletes, such as their own individual motivation to recover and engage with the treatment programme (Espindola & Blay, 2009; Federici & Kaplan, 2008). However, it is likely that athlete specific factors may also be pertinent. For example, one recent study found that athletes were highly motivated to recover from an eating disorder by the prospect of being able to return to their sport (Arthur-Cameselle & Quatromoni, 2014).

In summary, athletes are at a significantly increased risk of eating disorders, and much research has been done to establish the risk factors and prevalence rates with a variety of different sports groups. However, there is limited understanding of individual athlete experiences of eating disorders, and particularly how athletes experience seeking and receiving treatment. Improving our understanding of the experiences of treatment and recovery at an individual level among athletes
will help to inform clinical practice and treatment delivery, as well as support the development of evidence-based guidelines for coaches, practitioners and athletes alike. The broad research question guiding this study was as follows: How do athletes experience seeking and engaging in treatment for an eating disorder, and what challenges do they face?

Method

Participants

Fifteen participants (\(n = 13\) female, \(n = 2\) male) were recruited from four UK NHS eating disorder services. There were two sets of inclusion criteria, in relation to their clinical and athlete status. Firstly, all of the participants had to be: (i) currently receiving treatment for an eating disorder; (ii) over the age 18 years, with English as their first language; and (iii) deemed well enough to take part in the study by their clinician. To ensure that the participants were athletes as opposed to recreational exercisers, participants also had to be: (a) currently training or previously trained for a particular sport, (b) to have been involved in competition in that sport and (c) to have either currently or previously had a sports coach.

The mean age of the participants was 25.05 years, \((SD = 9.23; \text{range 18 to 47 years})\). Their mean BMI was 19.88 kg/m\(^2\), \((SD = 3.37; \text{range 14.45 to 26.81 kg/m}^2)\). All of the participants were currently receiving treatment for an eating disorder, either as an outpatient \((n = 11)\); in day care \((n = 3)\) or on an inpatient ward \((n = 1)\). Nine participants reported receiving inpatient care over the course of their eating disorder. The participants reported their current eating disorder diagnosis, of which seven had a diagnosis of bulimia nervosa, four had a diagnosis of anorexia nervosa, and the remaining four had a diagnosis of eating disorder not otherwise specified (EDNOS).

Just under half \((n = 7)\) of the participants were currently training and competing in their sport; the remaining participants had retired from competitive sport \((n = 2)\) or were unable to engage in sport due to the severity of their eating disorder \((n = 6)\). Nine participants were involved in lean sports (including triathlon, endurance running, figure skating or dance). Six participants were involved in non-lean sports (including hockey, badminton and throwing events). Participants had been involved in their sport for a mean of 9.34 years \((SD = 4.01)\), and the majority competed at national level or above \((n = 9)\), or at regional level \((n = 3)\) within their respective sports. The participants completed an average of seven hours each week of exercise \((M = 6.97\text{h}; SD = .42)\), although five of the participants reported being precluded from exercise within their respective treatment programme. The same sample of athletes took part in studies 6 and 7. The athletes also provided questionnaire data that was utilised in studies 2 and 3.

Procedure

The study was approved by both the National Health Service’s (NHS) and the institution’s Ethical Advisory Committee. Clinicians and therapists at the four NHS eating disorder support
services were sent details about the study and the inclusion criteria for participation. The researcher also presented at relevant continuing professional development groups and therapist meetings to enable clinicians to ask further questions about the study and to clarify any aspects of the study that were unclear. This facilitated recruitment of participants who met the specified inclusion criteria, through discussion with clinicians about their current client lists. The clinicians identified eligible clients and provided them with information about the study and what was involved. The participants were then able to contact the researcher to ask further questions, before deciding whether or not they were willing to take part. The participants provided informed consent prior to participation in the study. They were informed that the interview could either take place on the telephone or face-to-face; all of the participants chose to do the interview face-to-face. The interviews were conducted in a private room at the service where participants were accessing support. Participants completed demographic questions and self-report measures of eating, exercise and emotional attitudes and behaviours either prior to the interview date or immediately prior to the interview.

The participants took part in a semi-structured interview exploring their experiences of treatment and recovery. The interview schedule was developed through consultation with the literature and through discussions with clinicians and research experts in the area of eating disorders in sport. The interview covered topics such as the participant’s motivations for seeking treatment, how they went about seeking support, any challenges or barriers that they encountered in treatment and their experiences of treatment and recovery. The interviews were conducted by the first author, and lasted a mean duration of 64.60 minutes; range = 28 - 112 minutes. The interviews were then transcribed verbatim (mean = 9,709 words).

**Measures**

In order to determine levels of eating psychopathology, for the sole purpose of enabling replication of this study, all participants completed the Eating Disorder Examination Questionnaire prior to being interviewed.

**The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008)**

The EDE-Q is a 28-item self-report questionnaire, which focuses on the previous 28-day period, and asks participants to rate how often they have felt a particular way or engaged in the eating behaviours specified. The measure is scored on a 7-point Likert scale from 0 (No days) to 6 (Every day), with higher scores indicative of greater severity of eating psychopathology. The EDE-Q has four subscales: Restraint, Eating Concern, Weight Concern and Shape Concern. The global score is the mean of the four subscale scores. The EDE-Q has previously been used with athlete samples to assess eating attitudes and behaviours and to indicate severity of eating psychopathology (Hulley & Hill, 2001; Shanmugam, Jowett & Meyer, 2014).
**Data Analysis**

First, descriptive statistics were calculated for the EDEQ. Second, Interpretive Phenomenological Analysis (IPA; Smith, 1996) was applied to the interview data to explore the athletes’ experiences of seeking and receiving treatment for their eating disorder. IPA can facilitate an in depth understanding of the perspectives of the participant and their experiences (Conrad, 1987). The analysis followed the procedures outlined by Smith & Osborn (2008). First, familiarisation with the data occurred through the process of transcription and readings of the dataset. Second, the data were annotated to facilitate familiarisation with the dataset and the identification of themes that were pertinent to the research questions. Themes identified within each interview were listed and potential connections between the themes were explored. The themes identified early on in the analysis served to facilitate analysis of subsequent transcripts, although this was an iterative process and early transcripts were likewise reviewed for any new themes that were identified later on in the analysis. The final stage involved identifying appropriate excerpts from that data to reflect the themes. To support interpretation of the data and to acknowledge the potential biases of just one researcher conducting the analysis, a second researcher analysed three of the transcripts according to the principles of IPA (Smith, 1996). Discussions were then held between the two researchers to explore differing interpretations of the data and to highlight alternative connections between the themes. In addition, other members of the research team were consulted to act as ‘critical friends’ (Sparkes & Smith, 2002), through challenging the researcher’s initial interpretations and encouraging alternative perspectives.

**Results**

The mean EDE-Q Global Score was 3.35 ($SD = 1.36$). Mean scores for the individual subscales were as follows: (a) Restraint ($M = 2.67; SD = 1.40$); (b) Weight Concern ($M = 4.07; SD = 1.55$); (c) Eating Concern ($M = 3.41; SD = 1.42$); and (d) Shape Concern ($M = 3.26; SD = 1.66$). The scores on the EDE-Q are slightly lower than found among other clinical samples (Aardoom, Dingemans, Slof Op’t Landt & Van Furth, 2012; Welch, Birgegard, Parling & Ghaderi, 2011), but higher than those reported among non-clinical athletes (Hulley & Hill, 2001). A diagram of the results is provided in Figure 9.1. There were three superordinate themes: Challenges to seeking treatment; Motivation to engage with treatment; and The impact of exercise on recovery.
Figure 9.1 Influences on the treatment & recovery process among athletes with eating disorders

- **Practical barriers**
  - Logistical
  - Financial
  - Resources

- **Psychological barriers**
  - Support from coaches /peers
  - Anxiety
  - Acceptance of ED

- **Motivation to engage with treatment**
  - Perceived value of treatment
  - Specificity
  - Understanding of athlete status
  - Coach involvement

- **The impact of exercise on recovery**
  - Exercise attitudes & behaviours
  - Nature and function of exercise
  - Exercise restriction & reintroduction
  - Athlete status & identity
Challenges to Seeking Treatment

The first superordinate theme related to barriers to treatment seeking. Athletes identified two main problems with accessing appropriate support: First, *practical issues*, such as knowing where to seek support or advice, and logistical issues such as financial barriers. Second, *psychological issues*, such as anxiety over seeking treatment for an eating disorder, and experiencing a lack of support from their National Governing Body or coach.

1. Practical issues in seeking treatment

A number of athletes were unsure about *where* and *how* to seek support for an eating problem. They described lacking knowledge of who to approach or where to go for support, instead resorting to Internet search engines to find out more about treatment options and advice. “I was just looking on the internet and stuff about what sort of steps to take and most stuff sort of says just go to the doctor so I just thought I should go to the doctor” (20 year old female athlete; BN). Several athletes approached their coaches or peers, but were met with a significant lack of knowledge with regards to available resources or sources of support. Treatment seeking was therefore often athlete directed. For example, one athlete described a lack of knowledge among her coaching team and her limited expectations from them in terms of help seeking.

When I told him he just said I really like, I don’t really have any experience in this, like he really didn’t know what to say or do. And I just said well I’m not telling you because I want help, I’m telling you because I want you to know. I think sometimes he didn’t really know how to act. I don’t think any of them knew to be honest (22 year old female athlete with EDNOS).

Furthermore, for those athletes who were at a high level in sport, seeking support from the National Governing Body (NGB) was also not always straightforward. Athletes reported encountering logistical barriers in seeking treatment from outside of the organisation, such as difficulties in securing financial support for treatment costs.

I remember asking for funding from [NGB], ‘cos again I was sixteen, seventeen, like not earning a lot of money, it was coming out of my parents pockets really. And they said, no, they couldn’t fund it…Now I sit here and think that’s terrible because I really needed help and they couldn’t fund that (22 year-old female athlete; BN).

2. Psychological barriers to seeking treatment

Athletes also identified psychological and emotional barriers to seeking support. Over half of the athletes reported feeling anxious about seeking treatment. Overcoming this anxiety was
challenging and often delayed their access to support services. For example, one athlete described struggling to summon up the courage to go to an eating disorders support group.

It still took me about a year once I’d found the place, to actually walk in. I’ve been registered on the website for three and a half years, but I’ve only known people here for about a year and a half (44 year old male athlete; AN).

For several athletes, seeking support was a result of a significant increase in the severity of their eating disorder, and a worsening in their psychological wellbeing and mental health. Athletes became more aware of the potential consequences of their condition and the high risk of mortality. For example, one athlete described his increasing frustration with, and awareness of, his eating disorder.

And I thought to myself…this is it now, I’ve had enough now, I can’t go on anymore and obviously from the things you see on the TV, I thought to myself if I do go on anymore, that could be me. I could be in hospital one day, you know, being like fed through a tube and it was scary to look at things, what could happen (20 year old male athlete; BN).

Lastly, athletes identified emotional support from a family member, coach, friend or partner as important in helping them to overcome their anxieties over seeking treatment. One athlete described her coach as an important ally when seeking support.

I think his involvement was like quite key because [the coach] could realise that it was affecting like a large area of my whole life and ‘cos he knew me quite well, like better than anyone else, he could see the effects like that it was having on me, that [the GP] couldn't see. It was good to have him like reinforce what I’ve been telling them as well (20 year old female athlete; BN).

Motivation to engage with the treatment programme

A second superordinate theme to emerge was the athlete’s motivation to engage with recovery. Three important influences on athlete motivation were identified: (i) the perceived relevance and value of their treatment; (ii) recognition of their athlete status within the treatment environment; and (iii) the involvement of their coach in the recovery process.

1. Perceived relevance and value of treatment programme

One element that had an impact on motivation for recovery was how relevant athletes perceived their treatment to be. Several athletes described their treatment as too generic and
lacking relevance, describing a preference for treatment that acknowledged and incorporated their athletic behaviours and identity. For example, one athlete described feeling misunderstood within the treatment context.

I started to get a bit frustrated actually with NHS stuff because it’s so generic. I don’t feel like I had a typical eating disorder. It just felt like people didn’t understand me and the athlete side of it at all (20 year old female athlete; BN).

A large proportion of the sample described feeling ‘different’ or ‘out of place’ within the treatment environment, as a result of their sporting involvement, and in terms of their weight and appearance. “I did kind of feel like I was the odd one out. I was like a completely different case. I think [because of] the sport side of it; also partly my appearance was quite different” (22 year old female athlete; BN).

2. Recognition of athletic identity by staff

Athletes identified the knowledge and understanding of staff within the treatment environment as having an impact on their own motivation to engage with treatment. A small number of athletes felt that their clinician understood their athletic identity and goals. This had a positive impact on their motivation to recover, giving the athlete confidence that their clinician had incorporated their individual circumstances into the treatment plan. For example, one female athlete described how her therapist worked with her to establish treatment goals, which were developed within the context of her athletic identity.

She like said to me, ‘I’m not gonna change what you want to do, I’m not gonna be able to stop you.’ She kind of like works with the fact that she’s not gonna change me, so let’s make the best of the situation; so that’s quite good (22 year old female athlete; EDNOS).

In contrast, most of the athletes described feeling misunderstood within the treatment context, and expressed frustration with a ‘one-size-fits-all’ therapeutic approach. Athletes expressed concerns that their sporting goals were rarely acknowledged or discussed, and described this as having a significant negative impact on their motivation to engage with recovery. For example, one athlete described a lack of communication over her return to sport, and the impact this had on her motivation to engage with her treatment plan.

Initially I started to like try and eat more so that I could get back [training], but I didn’t really have any specific goal because I didn’t know when I was gonna be allowed, so I guess I kind of felt like …oh I’ll just keep eating and no-one’s gonna let me go back so there’s no point in trying any way (18 year old female athlete; AN).
3. Coach involvement

Only a minority of athletes involved their coach in the treatment process; however their inclusion was described as extremely helpful to their overall recovery. Liaisons between the coach and clinician were regarded as highly positive, particularly with regards to the reintroduction of training. Athletes described feeling reassured that they would (eventually) be able to return to training and that their sporting goals had been acknowledged by the treatment team. “We arranged like a meeting with my coach, to like figure out how to get back [training], then I felt a bit more confident that they were taking it a bit more seriously” (18 year old female athlete; AN). The coach was also identified as an important source of emotional support and motivation.

He’d always like ask like how I’m feeling and how my eating’s going and whether I was feeling tired and he’d ask more in the session like am I having any pain anywhere, and he was more a lot more aware. And I found that like really helpful. And I found that he…he cared a lot. And it helped like that he showed that he cared and that he understood that it was …that it was a problem (20 year old female athlete; BN).

The impact of exercise on recovery

The third superordinate theme was the impact of exercise on the recovery process. Athletes identified three important features of how exercise impacted on their recovery: (i) the nature and function of exercise, and how this changed over the course of their eating disorder; (ii) The transition into treatment, and the subsequent restriction of exercise; and (iii) the transition out of treatment, with exercise identified as a potential trigger for relapse.

1. The nature and function of exercise.

All of the athletes described being involved in sport prior to the onset of their eating disorder. Sport was enjoyable and many athletes described experiencing success quite quickly, which fuelled their commitment to the sporting ideal and lifestyle. “It happened really, really quick. In less than a year I’d qualified myself into the worlds and it just happened like a whirlwind” (22 year old female athlete; BN). However, most of the athletes reported a shift in their exercise attitudes and behaviours (becoming more compulsive) as their eating disorder developed. For example, one athlete described a change in focus from sports goals to calorie burning, which was associated with a loss of exercise enjoyment.

I mean at first it was ok and I was still, I was just doing the sport that I wanted to do, but then I started to feel bad if I ever missed a session and even if I didn’t want to go, I would go. And I still enjoyed it, but I suppose there were times that I didn’t, and I felt I had to carry on and push myself a bit harder. Then I started kind of calculating how much, how
hard I’d worked in a session to how much I would then eat (20 year-old female athlete; AN).

Exercise was identified as a way of elevating mood and preventing negative emotions such as anxiety or guilt. In addition, athletes described having reduced control over their exercise, such as continuing to exercise despite injury or engaging in highly rigid routines. For example, one athlete described her struggle to exercise normally, with activities becoming fixed and rigid into her weekly routine.

As soon as I start going [to the gym] on say a Monday, it’ll become in my routine so I’d have to go every Monday. So I daren’t start trying to do more in the week because it’ll become part of my rigid routine. So I’m hating having this gym membership at the minute (32 year old female athlete; AN).

In contrast, some athletes utilised exercise as a distraction when faced with eating disordered cognitions. For these athletes, exercise was an important regulating factor that supported recovery; this was particularly pertinent among athletes with bulimia nervosa diagnoses. One athlete described how exercising helped her to interrupt and break the binge-purge cycle.

[Exercise] it’s the last thing I want to do. But then as soon as I do it and after, like if I do a good exercise session then I feel a million times better straight away. Well, I still feel physically pretty terrible but psychologically must better, I feel like I’ve broken the cycle (20 year old female athlete; BN).

2. Transition into treatment (exercise restriction)

Many of the participants reported difficulties with the transition into treatment, primarily due to the sudden restrictions imposed on their exercise behaviour. “It’s probably one of the hardest things, actually stopping. You just don't want to do it” (21 year old female athlete; AN). Over half of the participants in this study were not currently training for their sport. Exercise had either been precluded by a clinician as a condition of their treatment programme, or athletes had been advised to stop by their coach. Several of the athletes perceived the restriction of exercise as having an adverse effect on their recovery. For example, one athlete described how she perceived exercise to be part of her identity, and not simply a consequence of her eating disorder. “Some people will only start to exercise since the disorder, but that’s all I’ve ever done, and I find that they don’t really understand that here and they don’t really know how to deal with it” (22 year old female athlete; EDNOS). Similar challenges were described by athletes who were admitted into hospital. “When you’re in hospital especially, they’re like well that’s [athlete goals] not the point
now you need to do this, you need to get better. They're like ‘this is the rules of this hospital’ (22 year old female athlete; EDNOS).

‘Secret’ exercise was a common feature among athletes who were prevented from exercising. One athlete suggested that being prevented from training actually caused a worsening of her symptoms, and she felt compelled to engage in exercise without the knowledge of her coach.

At night, every day I used to do 50 full squats, 50 lunges and 50 sit-ups of two variations and then 200 crunches and 50 push ups. And I used to start doing that every night before I went to bed because [my coach] stopped me from training (18 year old female athlete; BN).

Several athletes reported that communication from their coaches and clinicians with regards to the restriction of training was inadequate; with athletes often being left feeling unsure as to when, or if, they would be able to resume exercise. In addition, athletes reported a lack of support in coping with exercise restriction during treatment. “They say they try and help and I mean we can talk to staff about struggles, but in the end they just say stop exercising and it’s hard to” (20 year old female athlete; AN). A lack of open discussion within the treatment environment about coping with exercise restriction encouraged secrecy when athletes did engage in exercise.

You just don't really talk about it. They moaned at me for walking up the stairs out of here, and they don't like the fact I walk here in the mornings… They don't even like even fifteen minutes of walking a day. So I wouldn't tell them if I’d gone for a run or a bike ride or something (21 year old female athlete; AN).

A small number of athletes felt that their being prevented from exercising was positive in facilitating their recovery. These athletes still described significant difficulties in coping with the negative effects of not exercising, but were pragmatic about the need to abstain from exercise in order to recover from their eating disorder.

I think at the moment, I’m worried that if they said you could do a little bit, it’s almost easier to remove the whole temptation, ‘cos if you did a little bit each day, or a certain amount, I’d be worried that I’d get the love back for it. I’d be worried that I’d then want to start again, because I’d miss it and then I’d remember the thrill it gave me, ‘cos I did love it (21 year old female athlete; AN).

3. Transition out of treatment (exercise re-introduction)

A number of athletes were also concerned about the transition out of treatment and returning to their sport. In particular, athletes were concerned that exercising and taking part in
sport would promote a relapse in their eating disorder. Athletes described a lack of support within their treatment programme in facilitating a return to sport, particularly with regards to the nutritional demands of sports participation.

Yeah, that’s the one thing that scares me about when I leave here, if I start exercising, that’s why I don’t really wanna start exercising because then I’ll probably have to see a sports nutritionist. Cos all I got here last time was just like yeah, eat another snack. I think it would get me more confident to get back into sport though (21 year old female athlete; AN).

In addition, some athletes were anxious about a return to sport due to the impact their eating disorder and time away from training would have had on their performance level. As a result, it was clear that several athletes would not return to competitive sporting environment that they had previously been part of. “I’m not sure if I’m ever going to go back to it, I don’t know if that’s something I’d find too difficult to get back into now, because I know I won’t be at the standard I was” (20 year old female athlete; AN).

Discussion

This study aimed to explore the experiences of athletes undergoing treatment for an eating disorder. The findings highlighted the challenges that athletes face in seeking and receiving treatment. In particular, the evidence suggested that athletes struggle to engage with generic eating disorder treatments, and further emphasised the importance of sports coaches in supporting athletes through the recovery process. The study highlights a need for a multidimensional approach (engaging athletes, coaches and eating disorder professionals) with the treatment of athletes with eating disorders. This may require an increased focus on setting sports-specific treatment goals, and involving coaches and athletes closely in this process. It may be necessary to provide additional support to athletes when coming into and leaving treatment programmes, particularly with regards to managing their compulsive exercise.

This study can offer some important insights into athlete experiences of treatment and recovery, which can be utilised in tailoring treatment programmes to meet the specific needs of athletes. For example, athletes express concerns about seeking treatment for fear of being prevented from competing or being unable to return to their sport (Sherman & Thompson, 2001). The results from this study suggest that these fears may be valid, as athletes described the transition back into sport and competition as particularly difficult. Exercise can serve to maintain and exacerbate eating disorder symptoms (Brewerton, Stellefson, Hibbs, Hodges & Cochrane, 1995; Davis et al., 1997) and abstaining from exercise may be considered necessary to facilitate recovery. However, the study highlights a significant perceived lack of support for athletes when
they wish to resume exercise on the transition out of treatment. In addition, these results suggest that, like many non-athlete patients (Colton & Pistrang, 2004; Petterson & Rosenvinge, 2002), athletes with eating disorders feel that they require an individualised treatment approach (i.e., that takes into account their athletic status). Indeed, previous studies have indicated that eating disorder patients (in general) often feel that the treatment they are receiving is not specific enough for them (De la Rie et al., 2006; Federici & Kaplan, 2008). It is plausible that this may reflect the characteristics of the eating disordered population, where narcissistic personality features are common (Steiger, Jabalpurwala, Champagne & Stotland, 1997). Whilst it is important for clinicians to be trained in those issues that affect athletes, it is unclear (due to the lack of quality treatment trials) as to whether currently available treatments are indeed less effective for athletes as compared to other patients. What is clear is that those who exercise compulsively tend to respond less well to generic treatments (Dalle Grave, Calugi & Marchesini, 2008; Solenberger, 2001).

Notably, features of compulsive exercise (Meyer, Taranis, Goodwin & Haycraft, 2011) were evident among the athletes in this study. Athletes described engaging in highly rigid exercise schedules, exercising for mood regulation, feeling guilty when exercise is missed, and exercising to control weight and shape. A treatment programme that incorporates sessions on coping with and reducing compulsive exercise may be of particular relevance for athletes. For example, the Loughborough Exercise Activity Therapy, or LEAP module (Meyer & Touyz, 2011; Taranis, Touyz & Meyer, 2009) is a recently developed series of sessions for use as part of the current CBT treatments, for eating disorder patients who compulsively exercise. Early indications suggest that patients leave treatment with healthier attitudes towards exercise in comparison to wait-list controls (Meyer & Touyz, 2011; Taranis et al., 2011).

The findings from this study can be used to inform guidelines for coaches and practitioners working with athletes of all levels, and importantly to develop guidance and information for athletes themselves. Most of the athletes in this study endorsed the involvement of their coach in the treatment process, both in practical terms and for emotional support and motivation. It is therefore recommended that clinicians working with athletes encourage the involvement of the coach where possible (Thompson & Sherman, 2010). In addition, the key role of coaches in motivating and facilitating recovery among athletes should be communicated in coach education workshops, to motivate coaches to remain actively involved where athletes are seeking treatment for eating disorders (Selby & Reel, 2011). A summary of recommendations are presented in Figure 9.2.

There are some limitations to this research. First, the participants varied in terms of their age, eating disorder diagnosis, the type of treatment they were receiving, their sport and competition level. Additionally, eating disorder diagnoses were self-reported; further research should ensure that these are clinician verified. However, the athletes were receiving treatment at the time of the study; therefore the issues raised are likely to be valid and pertinent, as opposed to a
retrospective study. Longitudinal studies would allow researchers to explore the effectiveness of eating disorder treatments with athlete groups and to establish what proportion of athletes are able to subsequently return to sport. This is an important area for future research to explore.

**Conclusions**

This is the first known study to explore experiences among athletes who are currently receiving treatment for an eating disorder. With limited knowledge of treatment efficacy among this group, this research takes an important step in identifying aspects of treatment programmes and context that athletes perceive may hinder or facilitate their recovery. The study highlights the importance of providing additional support to athletes when embarking on and leaving treatment programmes, and in managing their attitudes and beliefs about the “relevance of therapy”. It is also important to monitor their compulsive exercise attitudes and behaviours, to ensure they are engaged with their treatment programme and to enable a successful return to sport. Finally, the findings can be used to inform more specific guidelines and resources for key stakeholders (including athletes themselves, clinicians and coaches).

Figure 9.2 Recommendations for supporting intervention and treatment for athletes with eating disorders

<table>
<thead>
<tr>
<th>Context</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>Sport setting</td>
<td>Psycho-education and provision of resources for athletes, coaches and sports professionals to facilitate athlete access to eating disorders services</td>
</tr>
<tr>
<td></td>
<td>Work with governing bodies to ensure athletes’ care is funded and/or supported and to facilitate transition back into sport.</td>
</tr>
<tr>
<td>Clinical setting</td>
<td>Motivational work with athletes to encourage access to services and treatment engagement. Re-integration back into sport may be used as a motivator where appropriate.</td>
</tr>
<tr>
<td></td>
<td>Where group work constitutes a component of athletes’ treatment, clinicians may want to consider involving other athletes (where possible) in order to make the treatment more specific and relevant.</td>
</tr>
<tr>
<td></td>
<td>Clinicians to work closely to understand the role of sport for the athlete and the impact of exercise removal on each individual.</td>
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<td></td>
<td>Introduce additional sport and exercise related sessions into therapy to facilitate a healthier relationship with exercise.</td>
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<tr>
<td></td>
<td>Involvement of coaches during the therapeutic process to provide emotional support for the athlete, provide assistance and input into goal setting, and to work with athletes in the transition back into sport.</td>
</tr>
<tr>
<td></td>
<td>Additional dietary support for athletes from sport specific nutritionists.</td>
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Chapter 10  General Discussion

10.1 Introduction

This chapter summarises the findings of the research presented within this thesis. The implications of the findings for our understanding of eating psychopathology in athletes are considered, with a focus on the mechanisms for identifying and facilitating early intervention and treatment seeking in this group. The relative strengths and limitations of the research presented within this thesis are outlined. Finally, recommendations for further research areas, and the implications for the management of eating problems in athletes are examined.

10.2 Aims of this thesis

The overall aim of this thesis was to improve our empirical understanding of the identification and management of eating problems in athletes. Three main research questions were investigated, as listed below.

1. What is the link between exercise attitudes and eating psychopathology in athletes, and how can we measure it?

2. How do coaches currently identify and manage eating problems in athletes?

3. How do athletes experience eating disorders?

The first broad research question was addressed through assessing the construct of compulsive exercise among competitive athletes, and in exploring a possible mechanism for the relationship between compulsive exercise and eating psychopathology in this group. In addition, the thesis explored whether a measure of exercise attitudes could be useful in identifying athletes with elevated levels of eating psychopathology. The second research question was addressed by exploring the experiences of track and field coaches in identifying and responding to eating problems among their athletes, and in assessing some of the challenges that they faced in doing so. Finally, the third research question was addressed through exploring experiences of athletes with current eating disorders with regards to their “patient journey”, from the disclosure of their eating disorder to their experiences of seeking and receiving treatment.

The specific aims of each study in this thesis were as follows:

1. To explore the validity of the model of compulsive exercise (Meyer et al., 2011) within an athlete population and to assess links with eating psychopathology (Study 1).
2. To assess whether the Compulsive Exercise Test is a suitable screening measure for detecting athletes with elevated levels of eating psychopathology (Study 2).

3. To assess a potential mediating role for compulsive exercise in the relationship between emotion regulation and eating psychopathology in athletes and non-athletes (Study 3).

4. To explore the current strategies and methods that coaches utilise when identifying disordered eating among their athletes (Study 4).

5. To explore the responses and strategies that coaches employ when dealing with an athlete with an eating problem. (Study 5).

6. To explore athlete experiences of disclosing an eating disorder (Study 6).

7. To explore athlete experiences of seeking and receiving treatment for an eating disorder (Study 7).

Quantitative and qualitative methodologies were employed to address the specified aims. Quantitative methodologies were deemed appropriate to evaluate the validity of the multidimensional model of Compulsive Exercise (Meyer et al., 2011) and to establish appropriate cut-offs on the athlete version of the Compulsive Exercise Test. Mediation analyses (Baron & Kenny, 1986; Sobel, 1982) were employed to assess the role of compulsive exercise in the relationship between emotion regulation and eating psychopathology in athletes and non-athletes. In contrast, qualitative methodologies were employed where the research questions were more exploratory, due to limited pre-existing research and an absence of a theoretical framework. Qualitative approaches were therefore adopted in exploring coach identification and management of eating problems among athletes, and in exploring athlete experiences of disclosure and in seeking and receiving treatment. A summary of the findings of each of the studies in this thesis is presented below.

10.3 Summary of results

10.3.1 Studies 1, 2 and 3: Compulsive exercise and eating psychopathology in the athlete population.

The first three studies presented within this thesis aimed to explore the relationship between eating psychopathology and compulsive exercise within this group. The validity of the
Compulsive Exercise Test (CET) was explored as a potential screening measure for eating psychopathology among the athlete population. The findings from study 1 revealed that the subscales of Weight Control Exercise and Avoidance of Negative Affect were predictive of eating psychopathology within the athlete sample. As such, an athlete specific version of the CET (CET-A) was developed. This new measure was further evaluated in study 2. In particular, the study explored whether the tool might be suitable for use within the sporting context to facilitate identification of athletes with elevated levels of eating psychopathology. Receiver Operating Curve analysis (ROC) indicated that a cut-off score of 10.00 on the CET-A could sufficiently distinguish between athletes with and without a current eating disorder, and represented the optimal trade-off between specificity and sensitivity. Athletes scoring above the cut-off score were nearly 4 times more likely to have a diagnosis of an eating disorder than those below the cut-off. It is acknowledged that there is a need for longitudinal research to explore the predictive value of the measure in detecting eating psychopathology and long term outcomes in this group.

The results of studies 1 and 2 suggested a clear association between compulsive exercise and eating psychopathology in athletes. Study 3 explored a potential mechanism for this association among athletes and non-athletes. Compulsive exercise was explored as a potential mediator between difficulties in emotion regulation and eating psychopathology in athletes. The findings indicated that compulsive exercise is more closely linked to difficulties in emotion regulation among athletes than non-athletes. It is suggested that compulsive exercise is a maladaptive emotion regulation strategy that is associated with increased levels of eating psychopathology in athletes. Longitudinal research will allow the temporal relationship between difficulties in emotion regulation, compulsive exercise and eating psychopathology to be established.

10.3.2 Studies 4 and 5: Methods employed by coaches in identifying and managing eating problems in athletes.

The first two qualitative studies presented within this thesis explored the methods of identification (study 4) and management of eating problems in athletes by eleven track and field coaches (study 5). There were three key findings to emerge from study 4. First, the findings revealed a tendency of track and field coaches to rely on the physical appearance of athletes when making a judgement as to the presence of a potential eating problem. Second, difficulties in identifying eating problems were primarily located with the attitudes and behaviours of their athletes, as opposed to limitations in knowledge or experience among the coaches. Third, features of the sporting environment were identified that may contribute towards beliefs of the importance of weight for performance, such as the stereotypical beliefs held by coaches about the ‘ideal’ athlete body for performance.
Study 5 revealed individual differences in the strategies coaches employed when working with an athlete with an eating problem. Three different approaches were identified, including supportive, avoidant and confrontational strategies. The most effective strategic approach in terms of facilitating and promoting treatment seeking behaviours among athletes was the supportive approach. This was commonly adopted by coaches who had previous experience of dealing with an athlete with an eating problem, and by coaches who had access to resources and support pathways. In contrast, avoidant approaches were characterised by reluctance among coaches to take responsibility for the eating problem, and by limited knowledge, confidence and the availability of support. Finally, the confrontational approach encapsulated coaches who adopted an authoritarian coaching style, whereby strict rules and targets were imposed, with limited negotiation or empathy with the athlete. The availability of resources, the knowledge and experience of the coach and the willingness of the athlete to seek support were important factors affecting how coaches dealt with the athlete. These exploratory studies highlighted some of the challenges that coaches in track and field currently face in identifying and managing athletes with eating problems, and suggest a need for greater support, resources and education to be made available within the sporting context.

10.3.3 Studies 6 and 7: Athlete experiences of disclosing an eating disorder, and in seeking and receiving treatment.

The final two studies of this thesis explored the experiences of fifteen athletes with clinical eating disorders, particularly with regards to disclosing an eating problem and in seeking and receiving treatment. The findings revealed two distinct experiences of disclosure of an eating disorder by athletes. On one hand, some athletes voluntarily disclosed their eating problem to coaches, peers or family members. These athletes described being motivated to disclose and seek support, primarily as a consequence of the impact of the eating disorder on their athletic performance and identity. In contrast, athletes who were prompted to disclose described negative experiences of disclosure, and a lack of knowledge and empathy from those who approached them. Athletes were unwilling to disclose as they were concerned about being prevented from training and competing, and perceived their eating disorder to have an important function both as an emotional coping mechanism and in conferring a performance advantage through reduced weight and body fat. In addition, study 7 revealed the difficulties that athletes encounter in treatment settings, notably struggling to engage with ‘generic’ eating disorder treatments, and in relinquishing their exercise behaviours on entry to a treatment programme. The findings also highlighted the potential value of coaches in supporting athletes through the recovery process.

In particular, studies 6 and 7 highlighted the importance of educating coaches in how to approach athletes where a potential eating problem is suspected. The findings suggested a need for comprehensive education for athletes as well, to ensure that they are aware of the long term impact
of an eating disorder, both in terms of their health and their performance. The findings highlight a need for clinicians to include both athletes and coaches in setting goals within the treatment context, particularly with regards to the athlete’s recovery and return to sport. This may help to ensure athletes remain motivated and engaged throughout the treatment process.

10.4 Contribution of the results to the understanding of eating psychopathology in athletes

10.4.1 Compulsive exercise and eating psychopathology in athletes

The results of studies 1, 2 and 3 within this thesis suggest a potential role of compulsive exercise in the development of eating psychopathology in athletes, and provide support for the multidimensional model of compulsive exercise in this group (Meyer et al., 2011). In particular, the subscales of Weight Control Exercise and Avoidance of Negative Affect (Taranis et al., 2011) were found to predict scores on the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008). However, not all of the facets of the model were supported within the athletic population. The Lack of Exercise Enjoyment and Exercise Rigidity subscales from the original CET, did not emerge in the factor analysis with the athlete population. It is possible that this may have been a result of initial instability (Pallant, 2007). However, it is proposed that the exercise rigidity component may be less valid for athletes given their highly structured exercise schedules, which are usually externally regulated by a coach. It is plausible that rigid, self-imposed exercise schedules that lack external regulation or specific performance goals may be more closely aligned with eating psychopathology. An important facet to explore, therefore, would be whether athletes engage in exercise over and above that prescribed by their coach. Similarly, there is evidence to suggest that athletes are more likely to experience enjoyment when exercising with others or when working towards performance goals (McCarthy, Jones & Clark-Carter, 2008; Scanlan, Carpenter, Lobel & Simons, 1993), which may explain why the lack of exercise enjoyment scale was not relevant for this group.

Therefore, the initial model of compulsive exercise may require some modification for athlete groups, in light of their exercise motivations and externally regulated exercise schedules. Importantly, two of the three retained subscales were highly predictive of eating psychopathology in athletes (Weight Control Exercise and Avoidance of Negative Affect). This is in line with previous research with the CET (Goodwin et al., 2011; Taranis et al., 2011) and provides support for a mood regulatory function of exercise, which is closely aligned with eating psychopathology. Indeed, in study 3, compulsive exercise was shown to mediate the relationship between difficulties in emotion regulation and eating psychopathology in athlete populations. Importantly, the Mood Improvement subscale of the CET was not related to eating psychopathology, supporting a
negative reinforcing mechanism of compulsive exercise as opposed to a positive reinforcement mechanism (Meyer et al., 2011). Eating psychopathology is associated with motivations to engage in exercise to avoid negative emotions such as low mood and anxiety, as opposed to the positive, mood alleviating effects. This negative reinforcement mechanism has been demonstrated as closely associated with the severity of eating psychopathology among patients (e.g., Bratland-Sanda et al., 2010a; 2010b) and the evidence presented within this thesis suggests that it is also pertinent with regards to eating psychopathology in athletes. Whilst these findings present a clear association between the facets of compulsive exercise and eating psychopathology in athletes, it must be noted that the data were cross-sectional, and thus a cause and effect relationship cannot be inferred between these two factors.

In summary, athletes who exercise primarily to avoid and manage negative emotions (such as low mood, anxiety, guilt) and for weight control reasons may show increased levels of eating psychopathology. These could be useful symptoms for coaches, sports professionals and physicians to look out for when evaluating whether athletes are at risk of an eating disorder. Establishing athlete motives for exercise may be an important method of identifying eating problems within the sporting context, and the CET-A may be a useful tool for coaches, physicians and sports professionals to employ.

10.4.2 Compulsive exercise as a maladaptive strategy of mood regulation

Research has demonstrated that maladaptive strategies and difficulties with emotion regulation are pervasive across eating disorder diagnostic categories (Berking & Wupperman, 2012; Lavender & Anderson, 2010; Svaldi et al., 2012). Difficulties in emotion regulation can also engender an increased vulnerability to the subsequent development of eating psychopathology (McLaughlin et al., 2011). Study 1 demonstrated that the Avoidance of Negative Affect subscale was associated with and predictive of eating psychopathology in athletes, reinforcing the mood regulatory function of compulsive exercise. Consequently, in study 3, compulsive exercise was proposed as a maladaptive, avoidant strategy of coping with negative affect, (Gross, 1998), whereby an unwillingness to engage with uncomfortable psychological experiences results in behaviours that can prevent or modify such experiences (Hayes et al., 1996). Specifically, compulsive exercise was proposed as a mediator of the relationship between difficulties in emotion regulation and eating psychopathology in athlete and non-athlete groups.

The findings indicated that compulsive exercise in athletes is more closely linked to difficulties in emotion regulation and eating psychopathology than their non-athletic counterparts. It is proposed that compulsive exercise is a maladaptive strategy of managing emotions that is favoured among the athletic population. Importantly, limited research has previously explored maladaptive strategies of emotion regulation in athletes. This research is the first to highlight the potential detrimental impact of avoidance and suppression of emotion by athletes, particularly in
relation to eating psychopathology. Emotion regulation is prioritised within the sporting environment, due to the impact that athlete emotions can have on sports performance (Uphill et al., 2009). However, it is plausible to suggest that athletes resort to utilising maladaptive strategies of emotion regulation where they have limited knowledge or experience in employing more appropriate coping mechanisms.

The findings suggest a need to explore the associations between difficulties in emotion regulation, compulsive exercise and eating psychopathology to establish the temporal relations between the components, and to offer a mechanism through which appropriate interventions can be targeted. Additional contributing factors such as perfectionism require further investigation to assess whether these elements of the model can be replicated within an athlete sample. This is also pertinent given that compulsive exercise only represented a partial mediator of the pathway between emotion regulation and eating psychopathology.

The findings have important implications for the model of compulsive exercise with eating psychopathology in the athletic population (Meyer et al., 2011). The original model is shown in Figure 10.1, and a proposed revised model for athletes is shown in Figure 10.2. The findings in this thesis highlighted that exercise rigidity was not a component of compulsive exercise within the athlete population. This element is therefore not included in the modified compulsive exercise model for athletes. Similarly, exercising for positive, mood improvement reasons was not found to be correlated with eating psychopathology in athletes, hence this has also been removed from the model in Figure 10.2. In contrast, the avoidance of negative mood was found to be an important predictor of eating psychopathology in athletes, and compulsive exercise was identified as a potential mediator of the relationship between emotion regulation and eating psychopathology in athletes. These elements are thus represented within Figure 10.2.

In summary, the findings suggest a potential mechanism that can help to explain why athletes are at an increased risk of eating psychopathology. The results suggest that athletes may adopt compulsive exercise as a method of emotion regulation, and that this is more closely linked with eating psychopathology than for non-athletes. This may explain why eating disorders are more common among athletes. Whilst longitudinal research that can establish the temporal relationship between these factors is still required, it suggests that educating and helping athletes to develop more appropriate coping mechanisms may help to prevent eating disorders in this group.
Figure 10.1 The original multidimensional compulsive exercise model (Meyer et al., 2011)

- **Eating pathology**
  - Weight and shape concerns

- **Affect regulation**
  - Psychological Dependence
    - Positive Reinforcement
      - Mood Improvement
    - Negative Reinforcement
      - Avoidance of withdrawal

- **Compulsivity**
  - Guilt
  - Perceived negative consequences of stopping

- **Compulsive Exercise**

- **Perfectionism**
  - High standards
  - Self criticism

- **Rigidity**
  - Inflexible attitudes
  - Rules
Figure 10.2 A modified multidimensional compulsive exercise model for athletes

**Eating pathology**
- Weight and shape concerns

**Affect regulation**

*Psychological Dependence*
- Negative Reinforcement
  - Avoidance of withdrawal
- Difficulties in emotion regulation

**Compulsivity**
- Guilt
- Perceived negative consequences of stopping

**Perfectionism**
- High standards
- Self-criticism
10.4.3 Identification and disclosure of eating problems in athletes

A primary aim of this thesis was to explore the current methods of identification of eating psychopathology in athletes, and the ways in which identification might be improved or facilitated. Studies 2 and 4 adopted alternative perspectives on eating psychopathology identification. The former explored the discriminatory ability of the CET-A in identifying athletes with elevated levels of eating psychopathology, whilst the latter explored the methods of identification employed by coaches, who can play a key role in the identification of potential eating problems in athletes (e.g. Selby & Reel, 2011; Thompson & Sherman, 2010).

A questionnaire based screening measure, such as the CET-A (Appendix E), may be of considerable value to coaches and sports professionals alike in identifying athletes vulnerable to the development of eating disorders. The measure was found to sufficiently distinguish those athletes with elevated levels of eating psychopathology at a cut-off of 10 or more on the measure. It is anticipated that the screening measure will be easily to deliver and score within the sporting context, providing a clear mechanism for coaches and sports professionals to determine those athletes who may require further assessment and intervention. The measure is also likely to be better received by athletes in comparison to an eating based measure, due to its low face validity in comparison to eating behaviour questionnaires. This is important, as athletes have previously been found to modify their responses on eating based measures (Yates et al., 2001). In relation to Studies 4 and 5, coaches reported struggling with identifying some of the early warning signs and symptoms of eating problems among their athletes, and in knowing when it was appropriate to intervene and challenge the athlete about their eating behaviours. The CET-A can assist coaches in both of these areas, by screening athletes for potentially unhealthy attitudes towards exercise, which may indicate increased levels of eating psychopathology. It is important to note, however, that the prospective validity of the measure still needs to be established through longitudinal research. In particular, it may be pertinent for future studies to explore whether scores on the CET-A are predictive of the development of disordered eating, through assessing compulsive exercise behaviours and eating psychopathology over an extended time period.

The methods that coaches favoured in identifying eating problems in athletes tended to focus around observing physical changes to the athlete’s weight status. It is evident that coaches conceptualised eating disorders in athletes as “anorexia nervosa”, in that they expected to observe significant and rapid weight loss among their athletes where an eating disorder was present. These findings are in line with previous research that indicates that coach knowledge of, and confidence in identifying eating disorders was relatively low (e.g., Turk et al., 1999; Vaughan et al., 2004). Comparatively, the findings from study 6 suggested a need to support and advise coaches in terms of talking to athletes about their eating behaviours, particularly when an eating problem in suspected. Athletes perceived a lack of knowledge and understanding from those who approached
them about their eating disorders, which may complicate the process of disclosure further, and hinder the treatment seeking process.

A high level of responsibility has been placed on coaches within the academic and applied literature to take an active role in identifying and supporting athletes with eating problems, however as yet there has been limited investigation or indeed support provided for coaches to do so (e.g. Bonci et al., 2008; Selby & Reel, 2011; Thompson & Sherman, 2010). A number of recommendations emerged with regards to the ways in which coach knowledge of eating disorders can be improved, and in empowering them to utilise this knowledge to identify athletes with potential eating problems (see Figure 6.1 in Chapter 6).

This research has highlighted the need for further development of resources and provision of support for coaches, to enable them to take advantage of their pivotal position in supporting athletes with potential eating problems. With this in mind, it is acknowledged that coaches should not be expected to take full responsibility for eating problems amongst their athletes, and should be able to seek appropriate advice and support once they suspect a potential eating problem among their athletes. However, given the importance of early identification in determining the course and outcome of a potential eating problem, ensuring coaches have sufficient knowledge and confidence to identify the signs and symptoms of potential eating problems among their athletes is of critical importance.

10.4.4 Management and treatment of eating disorders in athletes

The final area of investigation within this thesis was with regards to the management and treatment of eating disorders in athletes. The thesis explored these experiences from both the perspective of the coach and athletes with clinical eating disorders (studies 5 and 7).

Previous literature has explored how coaches manage and deal with eating problems, using both quantitative (e.g., Sherman et al., 2005) and qualitative methods (e.g. Nowicka et al., 2013). The findings from studies 4 and 5 are largely in line with these, particularly with regards to the challenges faced in knowing where to seek advice from, encouraging athletes to admit they had an eating problem, and in encouraging athletes to seek support. However, the findings within this thesis also revealed individual differences in the strategies and approaches adopted by coaches when dealing with athletes with eating problems, reflecting the disparity in the levels of knowledge, confidence and support availability among the coaches in the sample. The identified coaching strategies closely resembled the literature with regards to caring styles and also parenting approaches (Baumrind, 1967; Treasure et al., 2007), providing some support for the three response styles that emerged within the qualitative exploration. It is important to acknowledge that these proposed response styles are not mutually exclusive, and a coach response towards an athlete with an eating problem is likely to be a result of coach, athlete, and environmental factors. From a positive perspective, the findings highlighted that where coaches had access to appropriate
channels of support, they were often more likely to actively support and encourage the athlete to seek appropriate help; highlighting a clear mechanism by which to further support coaches who are working with athletes with eating problems.

There is limited literature with which to compare the findings with regards to athlete experiences of eating disorder treatment and recovery; many of the findings were novel and offer some important aspects for further investigation, which are outlined below. However, Arthur-Cameselle and Quatromoni (2014) presented perspectives of recovered athletes on the factors that influenced their recovery from an eating disorder, highlighting the importance of the involvement of the coach throughout the recovery process. The athletes currently seeking treatment in the studies within this thesis also highlighted the involvement of their coach as an important and positive factor in their recovery. Indeed, the research presented within this thesis has highlighted the coach as instrumental at all stages of the athlete’s journey, through identification and disclosure of a potential eating problem, to treatment seeking, providing emotional support throughout the treatment process, and in facilitating the transition back into sport during the recovery process. The evidence highlighted that some coaches were indeed keen to engage with this role, whilst others required additional support in order to be able to do so. The findings also pinpointed ways in which coaches could be further empowered to acknowledge their role, most notably through additional support, education and the improved availability of resources.

In summary, there are some important issues to consider for athletes seeking treatment for an eating problem. Reporting a need for individualised treatment is not an uncommon perspective within the eating disorders, regardless of athletic status (De la Rie et al., 2006; Federici & Kaplan, 2008; Steiger et al., 1997). However, there are some important sports-specific features (such as the involvement of the coach, the restriction and reintroduction of exercise, and sports nutrition) that may require additional consideration when working with athletes.

10.5 Strengths of the present thesis

The individual strengths of each study have been discussed within the relevant chapters; however it is important to consider the overall strengths of the thesis when assessing the contribution the research makes to the academic and applied literature.

There are several strengths of the research included in this thesis. Firstly, a large sample of athletes was included when exploring the validity of the multidimensional model of compulsive exercise (Meyer et al., 2011) and in determining an appropriate cut-off on the CET-A for detecting those athletes with elevated levels of eating psychopathology. Large sample sizes are necessary when employing factor analysis and receiver operating curve analysis, to ensure that the findings are generalizable beyond the specific sample included in the study (Field, 2005). In addition, these samples included both male and female athletes, who were from a variety of sports; of varying
competitive levels; and who presented with varying degrees of eating psychopathology, compulsive exercise and difficulties with emotion regulation. Therefore, it is likely that the findings can be generalised beyond the population investigated.

A second strength of the thesis was that experiences of eating problems in athletes was investigated from more than one perspective, by including samples of both coaches and athletes. The focus on coach experiences was a novel approach to the issue, but one which was considered paramount given the responsibility and expectation that is often assigned to coaches in identifying and managing potential eating problems in sport (Selby & Reel, 2011). Previous qualitative research has focused primarily on exploring the experiences of athletes, but this has resulted in coaches being portrayed in a negative light in terms of their actions and attitudes with regards to eating and weight in the sporting context (e.g., Jones et al., 2005; McMahon & Dinan-Penney, 2012). The current research has offered an alternative perspective, by highlighting the challenges that coaches face when managing eating problems in athletes, and suggesting potential ways in which these barriers and difficulties can be overcome through improved support pathways and resources.

A third strength of this thesis was the inclusion of a sample of athletes who were currently receiving treatment for a clinical eating disorder. This is the first known study to include a comparatively large sample (from the perspective of qualitative investigations) of athletes who are currently undergoing treatment, and to explore their experiences and perspectives on that process. Previous studies have either investigated athletes who are already recovered (e.g. Arthur-Cameselle & Quatromoni, 2014), focused primarily on participants with subclinical eating problems (e.g., Busanich, McGannon & Schinke; Papathomas & Lavallee, 2006) or in-depth singular case studies of individual athletes (e.g. Jones et al., 2005; Papathomas & Lavallee, 2012; 2013). The sample included in this thesis is therefore somewhat unique, and allowed the exploration of novel research question in relation to experiences of disclosure and treatment seeking in an athlete group.

The clinical sample of athletes also included both males and females, from across the diagnostic spectrum and who were involved in a variety of different sports. In addition, not all of the athletes were competing at the elite level. Much of the published research with regards to eating psychopathology in sport has tended to focus on athletes who are at national and international level and who are competing in lean sports, where the risk of developing eating disorders is considered to be higher (Papathomas & Lavallee, 2012a). For inclusion in the clinical sample, level of competition was not specified, and athletes competing in any sport were included, to ensure that athlete experiences were given equal weighting and importance, regardless of their sport or achievement level.
10.6 Limitations of the present thesis

Despite the clear strengths of the research included in this thesis, there are some limitations to consider. The limitations of each individual study have been considered in each of the relevant chapters; however the broad limitations of the thesis are presented here.

10.6.1 The effect of depression, anxiety and perfectionism

There were several factors that were not controlled for when exploring the relationship between exercise attitudes and eating psychopathology in athletes, notably depression, anxiety and perfectionism. It is possible that co-morbid conditions such as depression or anxiety could explain a significant proportion of the variance in the relationship between compulsive exercise and eating psychopathology among athlete groups, which were not accounted for in the present studies. Depression, anxiety and perfectionism have been found to be co-morbid with eating psychopathology in the general population (e.g., Godart, Flament, Perdereau & Jeammet, 2002; Jacobi et al., 2011; Keel & Forney, 2013; Swinbourne & Touyz, 2007), although the depth of the literature is more limited with athlete groups. There is, however, some evidence to support the association between perfectionism and eating psychopathology in athletes (Goodwin et al., 2014; Shanmugan et al., 2011), whilst the anxiety literature has focused primarily on the link with social physique anxiety (e.g., Haase, Prapavessis & Owens, 2002; Sanford-Marten et al., 2005). Recent longitudinal evidence exploring depression in athletes suggests that eating psychopathology increases the risk for subsequent depression, as opposed to the other way round (Shanmugam, Jowett & Meyer, 2014b). It is important to control for potential co-morbid conditions such as depression and anxiety in future research exploring the link between compulsive exercise and eating psychopathology in athletes. However, the research within this thesis has highlighted an important relationship between exercise attitudes and eating behaviours in the athletic population, and has opened up the possibilities of conducting additional research within this area to explore this relationship more fully.

10.6.2 Self-report and cross-sectional data

As with much questionnaire-based research, there are limitations with regards to collecting data through self-report questionnaires. The three quantitative studies included in this thesis collected information about participant exercise, eating attitudes and emotion regulation strategies using self-report measures. These measures were carefully chosen following a review of the literature and the reliability and validity of each measure (as detailed in Chapter 2); however self-report issues still remain. It is suggested that participants may over or under-report their eating, exercise and emotion regulation behaviours and attitudes, which may be a reflection of their current emotional state, their individual interpretation of the questions, or a systematic bias such as
making socially desirable responses (Carter, Aime & Mills, 2001). However, the inclusion of qualitative methods in this thesis ensures that the conclusions drawn are not only based on self-reported questionnaire data. Indeed, there was evidence for compulsive exercise among the athletes included in studies 6 and 7, supporting the validity of this construct outside of the self-report studies.

In addition, it is acknowledged that the quantitative studies exploring the relationship between compulsive exercise, eating psychopathology and emotion regulation were conducted cross-sectionally. Thus, the direction of the relationship between these factors cannot be inferred from the current studies. There is a need to explore these issues longitudinally and establish the temporal relationships between these factors. In particular, it is suggested that the CET-A may be useful as a screening measure for elevated eating psychopathology among athletes, given that previous research has indicated exercise changes tend to occur prior to the onset of eating disorder symptoms (e.g., Davis et al., 1994). However, this temporal relationship has yet to be established in athletes, which is important to acknowledge when advocating the use of the CET-A within the sporting context.

10.6.3 Recruitment and sample biases

It is also important to acknowledge potential recruitment biases that may have existed, particularly with regards to the two samples for the exploratory studies (studies 4, 5, 6 and 7). The athlete sample (included in studies 2, 3, 6 and 7) was recruited from four treatment centres within central regions of the UK. Five athletes who contacted the researcher for further information did not participate in the interview. Their reasons for non-participation were not provided; therefore it is difficult to infer the potential impact on the nature of the sample. However, it is acknowledged that only those participants who were willing to discuss their eating issues took part in this study. In addition, the literature presents high prevalence rates for eating disorders among athletes, and yet there were only very small numbers present in treatment settings; the recruitment of athletes for studies 6 and 7 was a considerable challenge. Four different eating disorder services were approached, with an average of 4-5 participants recruited from each one over the course of an 18 month period. The clinicians who were involved in the recruitment process also reported low numbers of athletes within their respective services. Given the high prevalence rates presented within the literature (e.g., Sundgot-Borgen & Torstveit, 2004), it would be anticipated that there would be relatively high numbers of athletes seeking treatment from NHS services in the UK. It is possible that eating issues may resolve once the athlete is no longer engaged in competitive sport, having been maintained by the pressures within the sporting context. It is also possible that athletes seek support from services outside of the National Health Service, perhaps which are facilitated by the relevant sporting governing body. Alternatively, the small numbers of athletes in the NHS
treatment context may reflect the difficulties and challenges that athletes face in both disclosing an eating problem, and in seeking support.

The studies with track and field coaches (studies 4 and 5), were advertised to athletics clubs across the country and in a variety of sporting contexts, and were deliberately targeted at coaches with previous experience of coaching an athlete with an eating problem. It is likely that only those coaches with a particular interest in the area of research responded to the advert and took part in the study. This could have potentially biased the sample and the themes and results of the research. Additional research with coaches from a wider demographic and who have not had experiences with athletes with eating problems may offer a wider perspective on the issues of identifying and managing eating problems in athletes.

10.7 Future directions for research investigating eating psychopathology in athletes

Several research questions have arisen as a result of the findings of the research in this thesis. These are presented below.

10.7.1 Longitudinal research into compulsive exercise and eating psychopathology

The temporal relations between emotion regulation, eating psychopathology and compulsive exercise are yet to be established. Research that assesses these factors over time would be useful to establish the prospective validity of the CET-A, and to inform the future development of interventions designed to address some of the early signs and symptoms of eating psychopathology in athletes. Longitudinal research could also evaluate the role of additional psychosocial factors that may be influential in the relationship between compulsive exercise and eating psychopathology, notably depression, anxiety and perfectionistic tendencies.

10.7.2 Sample

Future research should aim to include a larger proportion of athletes from aesthetic sports and aim to statistically evaluate whether the compulsive exercise model is invariant across sport type, competitive level and gender. It is possible that the current model is reflective of the high proportion of endurance athletes in the sample. These athletes may be more likely to use exercise to cope with their emotions, than those who are involved in ball or power sports. Endurance athletes tend to have a high training load; hence additional training and a commitment to exercise may be perceived to be consistent with the “good athlete” traits for endurance based sports (Thompson & Sherman, 2010).
10.7.3 Outcomes of athletes with eating psychopathology

Study 7 in this thesis raised some interesting questions with regards to the course and outcome of eating disorders among athletes. Much of the literature has focused on establishing the current prevalence rates and risk factors for eating disorders in athletes (Bratland-Sanda & Sundgot-Borgen, 2013; Papathomas & Lavallee, 2012a), but as yet, it has not been established what proportion of athletes go on to seek support, drop out of the sport, or indeed how many manage to make a successful return to sport after recovering from an eating disorder. These are important questions to explore in research with athletes, although it is acknowledged that this will be challenging due to the large sample sizes required. Longitudinal research methods are likely to be useful in ascertaining long term incidence and outcomes of eating disorders among athletes. Indeed, longitudinal research exploring eating psychopathology in athletes is currently sparse; the vast majority of research has been conducted cross-sectionally (Bratland-Sanda & Sundgot-Borgen 2013; Papathomas & Lavallee, 2013).

In addition, assessing the efficacy of various psychological therapeutic approaches with athlete groups is another important avenue to explore, given the somewhat ambivalent and apathetic perspectives on treatment programmes that were expressed by athletes currently receiving treatment (study 7). It is acknowledged that large scale randomised controlled trials may be difficult to achieve, however focus groups and qualitative studies exploring specific psychological therapies with athlete groups may present a good starting point.

10.7.4 Coach education efficacy and impact

A number of criteria have been proposed for inclusion in future coach education workshops, and for incorporation into the support mechanisms and resources made available for coaches. Given the paucity of current research that has evaluated the effectiveness of such psychoeducation workshops and materials, it suggests a need to not only implement the changes suggested within this thesis into current coach education programmes, but also to evaluate the impact of those changes in terms of the confidence and knowledge of coaches in identifying and managing eating problems in athletes, and in their attitudes towards weight, and weight monitoring strategies within the sporting context. Again, this is likely to require longitudinal research methods to evaluate the effectiveness of a psychoeducational approach over an extended duration.

10.8 Implications of the present thesis

The findings of this thesis have several key implications with regards to identifying and managing eating psychopathology in sport. These are expanded upon below.
1. The CET-A may be a useful tool for sports professionals and coaches alike to employ within the sporting context for assessing athlete vulnerability to potential eating problems. The measure is easy to complete and score, and may be better received among athletes than a measure of eating attitudes and behaviours (Yates et al., 2001). It is suggested that athletes who score above the proposed cut-off of 10.00 on the CET-A can then be referred for further assessment.

2. This thesis offers some key take-home messages with regards to the future development of coach education workshops. For example, it highlights a need to focus on dispelling the myths surrounding sport specific stereotypes and the ideal female athlete body, and in educating coaches about the key features of bulimia nervosa and the atypical eating disorders, which are common within the sporting context (Sundgot-Borgen & Torstveit, 2004). Coaches may also need support and guidance in how to approach and talk to athletes about a potential eating problem, in order to facilitate and encourage disclosure from athletes who may be struggling. The three response types of coach strategies in dealing with eating disorders may also be a useful topic for discussion within coach education workshops, in consideration of the potential impact on athletes. Coaches with experiences of managing eating problems in athletes should also be encouraged to share their experiences with the coaching community.

3. This research also has implications for athlete education efforts, particularly surrounding the notion of emotion regulation strategies. Compulsive exercise may represent a maladaptive strategy for coping with negative affect among athletes, which can increase the vulnerability of athletes to the development of an eating disorder. Athletes who struggle to manage their emotions may need support in adopting more adaptive emotion regulation strategies, such as cognitive reappraisal through self-talk and positive imagery (Lane et al., 2012). The relationship with exercise is also a topic that should be tackled with athletes within the eating disorder therapeutic environment.

   In addition, it remains important to identify athletes who are struggling with low mood or high levels of anxiety. Athletes with emotional issues may tend to use exercise as a coping mechanism, and thus be at an increased risk of eating problems. Recognising mental health issues such as depression and anxiety at an early stage is also important for the prevention of eating problems.

4. There is a need to ensure that athletes are aware of where to seek help for a potential eating problem, both within and outside of the sporting context. Sports governing bodies should
be encouraged to create clear support pathways and ensure funding is available for athletes who require support for an eating problem.

5. There is a need for clinicians to work closely with athletes to understand the role and implications of sport for each individual, and the potential impact of exercise removal on entering a treatment programme.

6. Clinicians should encourage coaches to be involved in the therapeutic process (where possible). Coaches can be an important source of emotional support for the athlete, and can offer input into the development of treatment goals and directions. This may help to ensure athletes remain engaged with the treatment programme. The reintroduction of exercise and training may be useful as a motivator for the athlete.

7. Where appropriate, athletes and coaches may require advice as to how to reintroduce exercise and training once treatment has been completed. Sport-specific dietary advice may also be useful on exiting a treatment programme.

10.9 Conclusions

The overall aim of this thesis was to improve our empirical understanding of the identification and management of eating problems in athletes. There were three broad research questions that were addressed: (1) What is the link between exercise attitudes and eating psychopathology in athletes, and how can we measure it? (2) How do coaches currently identify and manage eating problems in athletes? (3) How do athletes experience eating disorders?

First, the findings indicated that the facets of weight control exercise and avoidance of negative affect were closely associated with eating psychopathology in athletes. The results suggested that compulsive exercise may be a maladaptive strategy of emotion regulation employed by athletes, that may confer an increased risk of eating psychopathology. The CET-A was found to be a useful screening measure for use within the sporting context to detect athletes with elevated levels of eating psychopathology. Longitudinal research is required to explore other factors that may be important in explaining the relationship between compulsive exercise and eating psychopathology, such as depression, anxiety and perfectionism.

Second, considerable evidence was presented within the thesis to suggest that coaches can play an instrumental role in supporting athletes with eating problems. However, in order to support coaches to engage with this role, there is a need for additional coach education, resources, and clear support pathways within the sporting context. The impact of interventions with coaches should be evaluated longitudinally.
Finally, the studies revealed some important novel findings with regards to the challenges that athletes face in seeking and receiving treatment. To ensure athletes remain engaged with the treatment process, it may be important for clinicians to try to involve both coaches and athletes when agreeing treatment goals. Similarly, athletes may require additional support in the transition into and out of a treatment programme, particularly with regards to their exercise behaviours.

The findings have implications for addressing each stage of eating psychopathology in athletes, and offer clear direction for future research in this area. It is important to encourage researchers to move towards investigating issues regarding treatment and recovery among athletes. In particular, further work is required to establish the relative efficacy of psychological therapies with athlete groups and on exploring the outcome and trajectory of eating disorders among athletes.
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References


References


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278


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Doi:10.1016/j.psychsport.2012.05.001.


Doi:10.1002/erv.857.


Appendices

Appendix A: Ethical Approval (NHS)

Health Research Authority
NRES Committee East Midlands - Northampton
The Old Chapel
Royal Standard Place
Nottingham
NG1 6FS
Telephone: 0115839425
Facsimile: 0115839254

22 March 2012
Miss Carolyn R Plateau
PhD Research Student Loughborough University
Loughborough University
School of Sport, Exercise & Health Sciences
Loughborough University
Loughborough
LE11 3TU
Dear Miss Plateau,

Study title: Exercise, emotion and the coach-athlete relationship: Experiences of eating disorders in athletes.
REC reference: 12/EM/0074

Thank you for your letter of 15 March 2012, responding to the Committee’s request for further information on the above research and submitting revised documentation. The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see “Conditions of the favourable opinion”, below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.
Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation’s role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

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Appendices

Statement of compliance
The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements
The attached document “After ethical review—guidance for researchers” gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback
You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

112/EM/0074 Please quote this number on all correspondence

With the Committee’s best wishes for the success of this project

Yours sincerely

[Signature]

Mr Ken Willis
Chair

Email: jessica.parfement@nottsptc.nhs.uk
Enclosures: “After ethical review—guidance for researchers”
Copy to: Sponsor/R&D Contact- LPT
Appendix B: Ethical Approval (Institution)

LOUGHBOROUGH UNIVERSITY
ETHICAL ADVISORY COMMITTEE
RESEARCH PROPOSAL INVOLVING HUMAN PARTICIPANTS

Title: Investigating athlete and coaching beliefs about influences on athlete eating behaviour

Applicant: Prof C Meyer, J Arcelus, C Plateau

Department: SSEHS

Date of clearance: 21 April 2011

Comments of the Committee:
The Committee agreed to issue clearance to proceed subject to the following conditions:

- That the advertisement was amended to remove any reference to the prize draw.
- That the weekly exercise table was checked for spelling and typographical errors.
- That the Participant Information Sheet was amended to:
  - Include full contact details of all Investigators
  - Include a question, ‘What if I am not happy with how this research was conducted?’ and an answer that includes contact details for the EAC secretary.
- The Committee noted that the lay summary included in this research proposal was not suitable for non-expert members of the Committee. The Investigators are asked to consider this in future proposals.
Appendix C: Example Information Sheet and Consent Form

Exercise, emotion and the coach-athlete relationship:
Experiences of eating disorders in athletes
Participant Information Sheet

Introduction
You are being invited to take part in a research study. This research is one of a series of studies being conducted as part of the Chief Investigator’s PhD, (Carolyn Plateau). Before you decide whether or not to take part it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?
Athletes are at a greater risk of developing eating disorders than the general population. Research has found that detecting an eating disorder early is more likely to result in successful recovery; this highlights the importance of eating disorder education for people working with vulnerable individuals. Sports coaches may be one group who could benefit from such education.

The main aim of this research is to improve our understanding of how coaches and athletes interact in the case of an eating disorder. Through interviewing athletes with eating disorders, this research aims to improve our understanding of how coaches can best approach and manage athletes with eating problems. This may then inform the development of eating disorders education for coaches.

We are also interested in the thoughts and feelings associated with exercise amongst athletes who have an eating disorder. This may inform the development of athlete-specific education and treatment efforts in the future.

Why have I been chosen?
We are recruiting athletes who are currently receiving treatment for an eating disorder at the Leicester Eating Disorder Service, Northants Eating Disorder Service or Birmingham and Solihull Eating Disorder Service. There will be approximately 12 athletes taking part in this research.

Do I have to take part?
It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

What will happen to me if I take part?
Participants will be invited to read this information sheet and reply with whether you are interested in participating in the research. If you express interest in participating you will need to complete the information at the bottom of this form so that a member of the research team can contact you. Before taking part, you will be asked to sign a consent form. You will then complete a brief questionnaire about yourself, including your exercise, eating and emotional behaviour. Completion of this questionnaire should take no longer than fifteen minutes. The interview will be conducted at the hospital by the chief investigator (Carolyn Plateau) and will last approximately 45 minutes. Questions will focus on your experience of eating disorder as an athlete, your relationship with your coach and your experience of disclosing an eating disorder. There will also be some questions on your exercise behaviours and training. You will be invited to answer the researcher’s questions as fully as possible, however you do not have to talk about anything that you do not wish to. The interview will be taped so a record can be kept.

What do I have to do?
Please read the participant information sheet and complete the information at the bottom. Sign the consent form and return it in the envelope provided. A member of the research team will contact you to arrange a suitable time and place for you to complete the questionnaire and for the interview to take place.

What are the possible disadvantages and risks of taking part?
The main disadvantage of participating in the research is that you will be giving up some of your time for no return other than assisting with a research project. There is also a chance that some participants may find the interview distressing in talking about their
eating disorder. If this happens, you are free to end the interview. There is no obligation to answer any of the questions with no implications for the standard of care you will receive.

**What are the possible benefits of taking part?**
There are no direct benefits of taking part in this study. However, this type of research has not been conducted with athletes affected by eating disorders. By helping the research team to improve our understanding of the coach-athlete interaction and the thoughts and feelings associated with exercise in the case of an eating disorder, this may influence future developments to coach and athlete education and treatment. Therefore in the future, it could benefit individuals like you.

**What happens when the research study stops?**
The Chief Investigator (Carolyn Plateau) will write up the results of the study and discuss the implications of the findings with academic supervisors and clinicians. This information will be written up in the form of a journal article and you will be able to contact the people at the bottom of this form for a copy of it. You will also be provided with a clear summary of the findings in case you don’t want to look through a more lengthy report.

**What if there is a problem?**
You are free to withdraw from the study at any point, and you will be provided with details of additional forms of support should you need them. Your care will not be affected.

**What if I have a complaint about any aspect of the study?**
If you are unhappy about any aspect of the study and wish to make a complaint, please contact a member of the research team in the first instance. Contact details are given at the bottom of this information sheet. If you remain unhappy and wish to complain formally, you can do this via the NHS Complaints Procedure. Details can be obtained from the Birmingham and Solihull Mental Health NHS Foundation Trust Complaints Department on 0121 301 1084.

**Will my taking part in this study be kept confidential?**
Yes, the research team aims to ensure anonymity of all participants. All information that is collected about you during the course of the study will be kept strictly confidential as it has been throughout your contact with the service. However, if the Chief Investigator is concerned about information that is disclosed during the interview, this may be discussed with other members of the research team.
Participants will not be identifiable by their interview file or transcript as they will only be labelled numerically, and all names will be removed. Interview files will also be password protected and stored on one computer at Loughborough University. Your consent form which will be the only document with your name on, but these will be stored in a locked filing cabinet at the NHS site. Only the research team will have access to your information. Interview files will be destroyed a maximum of 12 months after the research has been completed. The study will comply with the Data Protection Act of 1998.

**What will happen to the results of the research study?**
The interview tapes will be stored in a locked cabinet until the project is complete. The research team (Professor Jon Arcelus, Professor Caroline Meyer and Miss Carolyn Plateau) will have access to the results, which will be retained for 10 years after the end of the study. Results of the study will be published and made available to a wider audience, but at no time will individual data be disclosed. All participants will have access to the results of the study, for further information please contact a member of the research team. Details are given at the bottom of this information sheet.

**Who is organising and funding the research?**
The research is being organised by Professor Jon Arcelus, (of Leicester Eating Disorders Service), Professor Caroline Meyer and Carolyn Plateau (of Loughborough University Centre of Research into Eating Disorders) as part of Carolyn Plateau’s PhD. The research is funded by Leicestershire Partnership NHS Trust (LPT), Loughborough University and On Camp with Kelly, in collaboration with Loughborough University Centre of Research into Eating Disorders (LUCRED).

**Who has reviewed the study?**
Northampton Research Ethics Committee has reviewed this research. All research that involves NHS patients or staff, information from NHS medical records or uses NHS premises or facilities must be approved by an NHS Research Ethics Committee before it goes ahead.
Contact for Further Information

Miss Carolyn Plateau
Chief Investigator
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School of Sport, Exercise and Health Sciences,
Loughborough University
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LE11 3TU
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Professor Jon Arcelus
Consultant Psychiatrist in Eating Disorders;
Visiting Fellow at LUCRED
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Dr Newman Leung
Consultant Clinical Psychologist
Eating Disorders Service
The Barberry
25 Vincent Drive
Edgbaston
Birmingham B15 2FG
0121 3012410

This information sheet is for you to keep.
Centre Number: 2
Study Number: 1
Patient Identification Number for this trial:

CONSENT FORM: PARTICIPANT

Title of project: Exercise, emotion and the coach-athlete relationship: Experiences of eating disorders in athletes.
Name of researcher: Miss Carolyn Plateau

I confirm that I have read and understand the information sheet dated 15.03.12 Version 3 for the above study and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.

I understand that data collected during the study may be looked at by individuals from the Birmingham and Solihull Mental Health NHS Foundation Trust and Loughborough University. I give permission for these individuals to have access to this data.

I consent to the interview being tape recorded.

I agree to take part in the above study.

__________________________   ___________    ____________________
Name of participant     Date  Signature

__________________________   ___________    ____________________
Name of person taking consent   Date  Signature
(if different from the researcher)

Carolyn Plateau
Researcher

1 copy for patient; 1 copy for researcher; 1 original to be kept with hospital notes.
Appendix D: Eating Disorder Examination Questionnaire - Version 6.0

**Instructions**

The following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all the questions. Thank you.

Questions 1 to 12. Please circle the appropriate number on the right. Remember that the questions refer to the past four weeks (28 days) only.

**ON HOW MANY OF THE PAST 28 DAYS...**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>No days</th>
<th>1-5 days</th>
<th>6-12 days</th>
<th>13-15 days</th>
<th>16-22 days</th>
<th>23-27 days</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Have you been deliberately <em>trying</em> to limit the amount of food you eat to influence your shape or weight?</td>
<td>0 1 2 3</td>
<td>4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight (whether or not you have succeeded)?</td>
<td>0 1 2 3</td>
<td>4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Have you <em>tried</em> to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?</td>
<td>0 1 2 3</td>
<td>4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Have you <em>tried</em> to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?</td>
<td>0 1 2 3</td>
<td>4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Have you had a definite desire to have an <em>empty</em> stomach with the aim of influencing your shape or weight?</td>
<td>0 1 2 3</td>
<td>4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Have you had a definite desire to have a <em>totally flat</em> stomach?</td>
<td>0 1 2 3</td>
<td>4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Has thinking about <em>food, eating or calories</em> made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?</td>
<td>0 1 2 3</td>
<td>4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Has thinking about <em>shape or weight</em> made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?</td>
<td>0 1 2 3</td>
<td>4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendices

<table>
<thead>
<tr>
<th>9</th>
<th>Have you had a definite fear of losing control over eating?</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Have you had a definite fear that you might gain weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>Have you felt fat?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>Have you had a strong desire to lose weight?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Questions 13-18: Please fill in the appropriate number in the boxes on the right. Remember that the questions only refer to the past four weeks (28 days).

<table>
<thead>
<tr>
<th>13</th>
<th>Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?</th>
<th>……………………………</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>… On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?</td>
<td>……………………………</td>
</tr>
<tr>
<td>15</td>
<td>Over the past 28 days, on how many DAYS have such episodes of overeating occurred (i.e. you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?</td>
<td>……………………………</td>
</tr>
<tr>
<td>16</td>
<td>Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?</td>
<td>……………………………</td>
</tr>
<tr>
<td>17</td>
<td>Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?</td>
<td>……………………………</td>
</tr>
<tr>
<td>18</td>
<td>Over the past 28 days, how many times have you exercised in a “driven” or “compulsive way” as a means of controlling your weight, shape or amount of fat, or to burn off calories?</td>
<td>……………………………</td>
</tr>
</tbody>
</table>

Questions 19 to 21: Please circle the appropriate number. Please note that for these questions the term “binge eating” means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

<table>
<thead>
<tr>
<th>19</th>
<th>Over the past 28 days, on how many days have you eaten in secret (i.e., furtively)? … Do not count episodes of binge eating</th>
<th>No days</th>
<th>1-5 days</th>
<th>6-12 days</th>
<th>13-15 days</th>
<th>16-22 days</th>
<th>23-27 days</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
Questions 22 to 28: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days)

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.</td>
<td>Has your weight influenced how you think about (judge) yourself as a person?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>23.</td>
<td>Has your shape influenced how you think about (judge) yourself as a person?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>24.</td>
<td>How much would it upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>25.</td>
<td>How dissatisfied have you felt about your weight?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>26.</td>
<td>How dissatisfied have you felt about your shape?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>27.</td>
<td>How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>28.</td>
<td>How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?</td>
<td>0 1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

What is your weight at present? (Please give your best estimate)  
What is your height? (Please give your best estimate)
**EDE-Q scoring instructions (Version 6.0)**

This is a 28 item questionnaire version of the EDE interview. It provides 4 subscale scores and a global score, as well as diagnostic information such as frequency of binge/purge. Each item is scored from 0 to 6 as indicated on the questionnaire, apart from frequency items which respondents complete themselves.

The items comprising the 4 subscales are:

- **Restraint (5 items):** 1, 2, 3, 4, 5
- **Eating Concern (5 items):** 7, 9, 19, 20, 21
- **Shape Concern (8 items):** 6, 8, 10, 11, 23, 26, 27, 28
- **Weight Concern (5 items):** 8, 12, 22, 24, 25

To obtain each subscale score, add up the total of the items for each subscale and divide by the number of items (i.e. create a mean score). To obtain the global score sum the four subscale scores and divide by the number of subscales (4).

Diagnostic items (Qs 13-18) simply give the frequencies for various behaviours.
Appendix E: Compulsive Exercise Test (Athlete Version)

The original Compulsive Exercise Test was a 24-item self-report measure designed to assess the core features of excessive exercise in the eating disorders (Taranis, Touyz & Meyer, 2011; Goodwin, Haycraft, Taranis & Meyer, 2011). Factor analysis of the original measure revealed 15 items that were deemed particularly relevant for competitive athletes (Plateau et al., 2014). These items were related to key components of excessive exercise, including: compulsivity, (e.g. continuing to exercise despite illness or injury, feeling extremely guilty when unable to exercise, and making up for missed sessions), affect regulation (e.g. the positive and negative reinforcement properties of exercise) and exercising for weight and shape reasons (e.g. exercising solely to burn calories, compensatory exercise such as debting).

The CET-athlete version uses a 6-point Likert scale anchored by 0 (never true) and 5 (always true), with higher scores indicative of greater pathology. The three subscales generated from the factor analysis were: Avoidance of Negative Affect; Weight Control Exercise; and Mood Improvement.

**Scoring criteria:**
Subscale scores are obtained by summing the scores for all items in the subscale and dividing by the number of items (mean score).
The global score is calculated by summing the mean scores for all subscales.

**Subscale Items:**
- Avoidance of negative affect 5, 6, 9, 12, 13, 14 (original items 9, 10, 16, 20, 22, 23)
- Weight control exercise 2, 4, 8, 11 (original items 2, 6, 13, 18)
- Mood improvement 1, 3, 7, 10, 15 (original items 1, 4, 14, 17, 24)
**CET – Athlete version**

**Instructions**
Listed below are a series of statements regarding exercise. Please read each statement carefully and circle the number that best indicates how true each statement is of you.
Please answer all the questions as honestly as you can.

<table>
<thead>
<tr>
<th>Never true</th>
<th>Rarely true</th>
<th>Sometimes true</th>
<th>Often true</th>
<th>Usually true</th>
<th>Always true</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1) I feel happier and/or more positive after I exercise
   
2) I exercise to improve my appearance
   
3) I feel less anxious after I exercise
   
4) If I feel I have eaten too much, I will do more exercise
   
5) If I cannot exercise I feel low or depressed
   
6) I feel extremely guilty when I miss an exercise session
   
7) I feel less stressed and/or tense after I exercise
   
8) I exercise to burn calories and to lose weight
   
9) If I cannot exercise I feel agitated and/or irritable
   
10) Exercise improves my mood
   
11) If I cannot exercise, I worry that I will gain weight
   
12) If I cannot exercise I feel angry and/or frustrated
   
13) I feel like I’ve let myself down if I miss an exercise session
   
14) If I cannot exercise I feel anxious
   
15) I feel less depressed or low after I exercise
Appendix F: Difficulties in Emotion Regulation Scale

Instructions

Listed below are a series of statements regarding emotions. Please read each statement carefully and circle the number that best indicates how true each statement is of you. Please answer all the questions as honestly as you can.

<table>
<thead>
<tr>
<th>Almost never (0-10%)</th>
<th>Sometimes (11-35%)</th>
<th>About half the time (36-65%)</th>
<th>Most of the time (66-90%)</th>
<th>Almost always (91-100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1. I am clear about my feelings.  
2. I pay attention to how I feel.  
3. I experience my emotions as overwhelming and out of control.  
4. I have no idea how I am feeling.  
5. I have difficulty making sense out of my feelings.  
6. I am attentive to my feelings.  
7. I know exactly how I am feeling.  
8. I care about what I am feeling.  
9. I am confused about how I feel.  
10. When I’m upset, I acknowledge my emotions.  
11. When I’m upset, I become angry with myself for feeling that way.  
12. When I’m upset, I become embarrassed for feeling that way.  
13. When I’m upset, I have difficulty getting work done.  
14. When I’m upset, I become out of control.
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15. When I'm upset, I believe that I will remain that way for a long time.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. When I'm upset, I believe that I'll end up feeling very depressed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. When I'm upset, I believe that my feelings are valid and important.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. When I'm upset, I have difficulty focusing on other things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. When I'm upset, I feel out of control.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. When I'm upset, I can still get things done.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. When I'm upset, I feel ashamed with myself for feeling that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. When I'm upset, I know I can find a way to eventually feel better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. When I'm upset, I feel like I am weak.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. When I'm upset, I feel like I can remain in control of my behaviours.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. When I'm upset, I feel guilty for feeling that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26. When I'm upset, I have difficulty concentrating.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27. When I'm upset, I have difficulty controlling my behaviours.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28. When I'm upset, I believe there is nothing I can do to make myself feel better.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29. When I'm upset, I become irritated with myself for feeling that way.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30. When I'm upset, I start to feel very bad about myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>31. When I'm upset, I believe that wallowing in it is all I can do.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>32. When I'm upset, I lose control over my behaviours.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>33. When I'm upset, I have difficulty thinking about anything else.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34. When I'm upset, I take time to figure out what I'm really feeling.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
The DERS is a brief, 36-item self-report questionnaire designed to assess multiple aspects of emotion regulation. The following items are reverse scored: 1, 2, 6, 7, 8, 10, 17, 20, 22, 24, and 34. Higher scores on the measure are indicative of greater difficulties with emotion regulation. The measure yields a total score and scores on six subscales, as follows.

**Subscale Items:**

- Non acceptance of emotional responses (Non Accept): 11, 12, 21, 23, 25, 29
- Difficulties engaging in goal directed (Goals): 13, 18, 20, 26, 33
- Impulse control difficulties (Impulse): 3, 14, 19, 24, 27, 32
- Lack of emotional awareness (Awareness): 2, 6, 8, 10, 17, 34
- Limited access to emotion regulation strategies (Strategies): 15, 16, 22, 28, 30, 31, 35, 36
- Lack of emotional clarity (Clarity): 1, 4, 5, 7, 9,

### DERS scoring instructions

<table>
<thead>
<tr>
<th>35. When I'm upset, it takes me a long time to feel better.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>36. When I'm upset, my emotions feel overwhelming.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix G: Athlete & Control Demographic Questionnaire

ID Number: ______

Descriptive Information

Instructions: Please complete all the following information as accurately as possible.

1. Gender: Female [ ] Male [ ] (please tick box that applies)

2. Age: .................. years .................. months

3. Describe your ethnic origin e.g. (White/British). ...................................................

4. What is your weight at present? .............. (kg) or ........... (stone) Please give your best estimate

5. What is your height? ............ (cm) or ............. (feet & inches) Please give your best estimate

6. Are you currently, or have you previously trained for and competed in a specific sport?
   Yes: Currently [ ] Previously [ ]
   No [ ] (If no, please skip to question 12)

7. If yes, which sport? ......................

   Event/discipline (if applicable) ..............................

8. For how long have you been actively training and competing in this sport? Years...........

   .months........

9. Do you currently, or have you previously had a coach for this sport?
   Yes: Currently [ ] Previously [ ]
   No [ ] (If no, please skip to question 11)

10. If yes, how long have you been coached for? ............ years .............. months

11. Please indicate the current level of competition you are participating at: (tick box that applies)

   School [ ] Regional [ ]

   Club [ ] National [ ]

   County [ ] International [ ]

   University [ ] Recreational (non-competitive) [ ]

12. Is English your first language? Yes [ ] No [ ] (tick box that applies)
13. Are you currently, or have you previously received treatment for an eating disorder?

Yes:  Currently ☐ or Previously ☐ or Never ☐ (if Never, please skip to question 17).

If currently or previously:

14. For how long have you had/ did you have (delete as appropriate) your eating disorder?

……..years……..months

15. For how long have you been/ were you (delete as appropriate) seeking treatment? .............years

...........months

16. Please indicate a diagnostic category:

Anorexia Nervosa ☐ Eating Disorder not otherwise specified ☐

Bulimia Nervosa ☐ No formal diagnosis received ☐

Please answer the following questions about your sport and exercise activities for the past month.

17. How many weeks during the last month (4 weeks) have you participated in, or undertaken some form of exercise? __________ weeks.

18. On average, how many exercise sessions did you do in a week, e.g., how many times would you exercise? __________ sessions per week.

19. On average, how long (in minutes) did each session last? (Tick box that applies)

1-30 ☐ 31-60 ☐ 61-90 ☐ 91-120 ☐ 121-150 ☐ 151-180 ☐ 180+ ☐

20. On average, how intense (i.e. how hard) was each exercise session? (Tick box that applies)

Mild ☐ Moderate ☐ Hard ☐
Appendix H: Coach Demographic Questionnaire

ID Number: _________

Background Information

Instructions: Please complete all the information as accurately as possible.

1. Are you: Male □ or Female □  1b. Age _______ years

2. Which sport(s) and/or event(s) do you currently coach?

____________________________________________________________________

3. What is the highest coaching qualification you currently hold?

________________________________________________________

4. How long have you been coaching for? _______________________________

5. How many hours each week do you normally spend coaching? _________________

6. What is the age range of the athletes that you currently coach? _________________

7. What level are the majority of the athletes you currently coach?

Club □  Regional □
County □  National □
University □  International □

8. Do you monitor your athletes’ weight at all? Yes □  No □

If yes, please indicate what monitoring strategies you use: (Please tick all that apply)
9. What training or education have you had regarding disordered eating or eating disorders in sport? *(Please tick all that apply)*

- None
- Attended lectures or workshops
- Read materials
- Website
- Talked with eating disorder experts
- Videos, DVDs or TV programmes
- Other (please specify)
Appendices

Appendix I: The Compulsive Exercise Test (CET)

The CET is the first measure of problematic exercise that has been developed specifically for use in eating disorders research and assessment, and within a cognitive-behavioural framework. It is a 24-item self-report measure designed to assess the core features of excessive exercise in the eating disorders; compulsivity (e.g. continuing to exercise despite illness or injury, lack of exercise enjoyment, the experience of extreme guilt when unable to exercise, making up for missed exercise sessions), affect regulation (e.g. the positive and negative reinforcement properties of exercise), weight and shape driven exercise (e.g. exercising solely to burn calories, compensatory exercise such as debting), and exercise rigidity (rigid adherence to a strict and repetitive exercise routine). Items were generated from a comprehensive appraisal of the eating disorder and excessive exercise literature, consultation with clinical eating disorder specialists, interviews with eating disorder patients, and a critical review of existing scales, and were included based on theoretical relevance and clinical specificity.

The CET uses a 6-point Likert scale anchored by 0 (never true) and 5 (always true) with higher scores indicative of greater pathology. Factor analysis revealed 5 factors explaining 63.5% of the variance. These were used to construct the 5 subscales of: avoidance and rule-driven behaviour, weight control exercise, mood improvement, lack of exercise enjoyment, and exercise rigidity. Initial validation results are encouraging with good internal consistency, content validity, and concurrent validity of the CET. The CET also demonstrates strong positive associations with measures of eating pathology and known correlates of disordered eating. It is concluded that the CET could be a reliable and valid instrument for use in both clinical and research settings.

CET Scoring Criteria:
Items 8 and 12 are reverse scored.
Subscale scores are obtained by summing the scores for all items in the subscale and dividing by the number of items (mean score).
CET total score is calculated by summing the mean scores for all subscales.

Subscale Items
Avoidance and rule-driven behaviour  9, 10, 11, 15, 16, 20, 22, 23
Weight control exercise  2, 6, 8, 13, 18
Mood improvement  1, 4, 14, 17, 24
Lack of exercise enjoyment  5, 12, 21
Exercise rigidity  3, 7, 19
CET

Instructions
Listed below are a series of statements regarding exercise. Please read each statement carefully and circle the number that best indicates how true each statement is of you.
Please answer all the questions as honestly as you can.

<table>
<thead>
<tr>
<th>Never true</th>
<th>Rarely true</th>
<th>Sometimes true</th>
<th>Often true</th>
<th>Usually true</th>
<th>Always true</th>
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<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1) I feel happier and/or more positive after I exercise.  
   0 1 2 3 4 5

2) I exercise to improve my appearance.  
   0 1 2 3 4 5

3) I like my days to be organised and structured of which exercise is just one part.  
   0 1 2 3 4 5

4) I feel less anxious after I exercise.  
   0 1 2 3 4 5

5) I find exercise a chore.  
   0 1 2 3 4 5

6) If I feel I have eaten too much, I will do more exercise.  
   0 1 2 3 4 5

7) My weekly pattern of exercise is repetitive.  
   0 1 2 3 4 5

8) I do not exercise to be slim.  
   0 1 2 3 4 5

9) If I cannot exercise I feel low or depressed.  
   0 1 2 3 4 5

10) I feel extremely guilty if I miss an exercise session.  
    0 1 2 3 4 5

11) I usually continue to exercise despite injury or illness, unless I am very ill or too injured.  
    0 1 2 3 4 5

12) I enjoy exercising.  
    0 1 2 3 4 5

13) I exercise to burn calories and lose weight.  
    0 1 2 3 4 5

14) I feel less stressed and/or tense after I exercise.  
    0 1 2 3 4 5

15) If I miss an exercise session, I will try and make up for it when I next exercise.  
    0 1 2 3 4 5

16) If I cannot exercise I feel agitated and/or irritable.  
    0 1 2 3 4 5

17) Exercise improves my mood.  
    0 1 2 3 4 5
### Appendix

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>If I cannot exercise, I worry that I will gain weight.</td>
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<tr>
<td>19</td>
<td>I follow a set routine for my exercise sessions e.g. walk or run the</td>
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<td></td>
<td>same route, particular exercises, same amount of time, and so on.</td>
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<tr>
<td>20</td>
<td>If I cannot exercise I feel angry and/or frustrated.</td>
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<tr>
<td>21</td>
<td>I do not enjoy exercising.</td>
<td></td>
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<tr>
<td>22</td>
<td>I feel like I’ve let myself down if I miss an exercise session.</td>
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<tr>
<td>23</td>
<td>If I cannot exercise I feel anxious.</td>
<td></td>
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</tr>
<tr>
<td>24</td>
<td>I feel less depressed or low after I exercise.</td>
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</tbody>
</table>
Appendix J: Reflective diary (Studies 4 and 5)

Preparation

I was a little bit nervous about the first interview. I’d practiced with Jon beforehand, and we picked up on a few areas that I needed to concentrate on, including:

- Avoid being too rigid with regards to the structure – explore the responses that people give you, like a conversation. You can always go back and expand on things if you need to later on.
- Try not to ask closed questions – leave the door open for people to respond fully.
- Try and formulate the question in your head before you ask it!
- It’s fine to go off topic but take care to rein them back in to the direction that you want to go.
- If someone asks you for your opinion on something, or asks you a question etc., then just say that if possible we could discuss that at the end rather than during the interview.
- Aim to be confident and allow enough time for pauses – don’t feel you have to fill every silence, they may be thinking. This is particularly important for phone interviews, as there are no cues from body language.
- Remember that once the interview is finished or you hang up, that is the end of the data collection & you can’t ring them back. Make sure you have covered and explored everything you want to cover before you end the phone call.
- Allow the participant to ask questions at the end, and make sure you thank them for their time.

Interview 1: Thursday 21st July 2011 3.30pm

I was surprised that the first interview went on for over 50 minutes, I’m not sure what I was expecting but there was a real willingness from the coach to talk about his experiences. Perhaps talking on the phone gives people a greater anonymity. On reviewing the transcript I noticed a tendency by myself to ask two questions at once, or by giving the participant two contrasting responses – I need to remember to leave the questions more open. Certainly the coach was doing most of the talking, but there were stages when he wasn’t talking about particularly relevant topics – perhaps it would have been worth trying to rein him in a bit, rather than encouraging this. Also, there were a couple of topics I could have investigated a bit further, namely why athletes don’t report their weight back to him, his perception of a draconian coach. Quite important for me to bear in mind the big research questions – what do coaches find is helpful in
these situations, how they react to certain situations and what coaches would like/need from a coach intervention/coach education.

Overall, I was pleased with how it went and the willingness of the participant to engage in the conversation, rather than having to force the responses. Trying to be a little more focused on interview two should hopefully help. It was interesting how he categorically stated that he would not coach an athlete who looked ‘like that’ after having described her as skeletal, and also acknowledges that there comes a point when athletes have gone beyond the coach or parents help. In addition, the coach expressed significant discomfort in raising the topic of menstrual function with his athletes. He expressed a preference to refer athletes to alternative resources, rather than initiate a potentially awkward conversation. This was interesting as it suggested a lack of confidence and potentially awkward knowledge in this area.

**Interview 2: Wednesday 27th July 2011 8pm**

The second interview took place on an evening, so I was at home where my phone signal was not quite as good – this involved standing in the kitchen for the duration. The participant did make one comment about not being able to hear properly and getting some funny feedback from the line, but there seemed to be little problem with communication once we had started. Again, this coach was very willing to talk about his experiences. He was a little less clear and required slightly more prompting than the first one, but in a way this was good as it kept the interview slightly more on topic and I could direct it where it needed to go. He was certainly doing a lot more of the talking though, which is good. The interview was perhaps more sensitive than the first one as this coach had had a more personal experience with an eating disordered athlete, in that he was her coach. It was therefore necessary to be quite sensitive when exploring the issues such as his decision not to coach her anymore, and his attempts to get her to eat so that she could continue training.

I found that with a bit of prompting and asking more specific questions, it was possible to get quite detailed answers on issues such as training, her responses and his suspicions about her eating habits. His focus with his other athletes tends to be on promoting healthy eating, but he certainly described a fear of saying the wrong thing and exacerbating a situation. Felt that the conversation flowed more naturally than the first, in that my questions tended to lead on quite nicely from what he was saying & it wasn’t quite as disjointed. The participant tended to pause quite a lot but I tried to leave extra time before saying anything – I hope this didn’t come across as me not listening or being unresponsive, but on a few occasions I felt that this was the right thing to do as he did start to speak again. Still not entirely happy with the way I formulated questions, and I do still have a tendency to ask more than one question if I don’t get an immediate response from the participant.
Interview 3: Thursday 28th July 2011 10 am

The third interview was face to face with a coach at Loughborough University. This meant that I had to book a suitable room for the interview to take place, which was relatively straightforward – the Liquid lab in Brockington was relatively easy to book and was nice and quiet for the interview. (Booked through Gillian Collard, g.collar@lboro.ac.uk).

This interview was a bit different to the others – it felt a bit more like a real conversation in that I think I spoke a bit more than in the previous two – sometimes there was overlap in speaking so I think I need to remember to let the interviewee talk when they want to talk, even if I have an important question. I felt that the participant required a little bit more feedback from me, as obviously they could gauge my response to their answers, but also I got interesting feedback when they were speaking. This coach was particularly knowledgeable about these issues, having attended a number of workshops and also from having coached female endurance athletes at the university for a number of years. He made some interesting points about early intervention, and the most appropriate types of intervention - suggesting that psychological intervention may actually be more helpful than nutritional as many athletes already ‘know’ what they should be eating, it’s motivating them to get in enough energy that is the hard bit. Also, athletes tend to lie about what they eat on food diaries for nutritionists, so getting something out of it is a bit difficult.

I gave the coach an opportunity to cover other things at the end of the interview that he wanted to talk about, and there was a couple of interesting things that cropped up which weren’t in my interview schedule – for example, an experience with an older athlete who’d had eating issues, talking to younger athletes who might have been at risk for some of these issues. He also highlighted the financial aspects of seeking help and the costs associated with nutrition and doctors’ appointments, even for athletes who have run internationally.

I think the interview was successful, the coach was relatively willing to talk about his experiences with his own athletes. It was interesting that he said he thought that full blown ED could be averted by proper management, endorsing the use of skin folds for providing objective support to his argument that an athlete should put on weight. However, he did acknowledge the importance of remaining lean in the season and also of the short term gains of losing weight for performance.

Interview 4: Monday 08th August 2011, 8pm.

This interview was very different to the others that I have conducted. Although I am yet to transcribe it, within two or three minutes of the interview, I immediately felt that I had to do more talking and to try and encourage the participant to talk. He was keen to just give short answers, and I was a little bit thrown by this, perhaps resorting to asking too many questions at the same time, and not really exploring his responses as well as I perhaps should have done. Sometimes he came out with some fairly controversial remarks, which again I wasn’t expecting and didn’t really know
how to respond to. This coach was also easily convinced of the absence of an eating problem, through a lack of noticeable weight loss and no changes to performance, which raises questions about coach expectations for an ‘eating disordered’ athlete – i.e. is low weight critical? I tried to encourage him to expand on his responses but this wasn’t terribly effective and I found I was doing quite a lot more talking than in the other interviews. I tried to make sure I had asked everything but I’m sure when I am transcribing the interview I will pick up on areas that I should have explored and areas where perhaps I was saying too much and influencing his responses. I hung up the phone and felt a bit disappointed that it hadn’t been as easy as previous interviews and perhaps that I hadn’t got quite as much out of the interview as I had hoped. He noted that the second scenario was particularly difficult, and admitted to not really having thought about it, which is perhaps an interesting finding in itself.

**Interview 5: Thursday 11th August 2011 10am**

This interview was again conducted on the phone, and I felt it was fairly successfully. The coach was very willing and easy to talk to. He had been coaching for nearly 30 years and was very experienced, coaching one of the UKs top female middle distance runners, as well as at a local club regularly. He had had a number of disordered eating experiences, plus two very serious cases of eating disorders in the time he had been coaching. He was very willing to talk about the cases, and expressed a number of issues in dealing with them. He again expressed the discomfort of having to say when it got to the extreme end, of not being able to coach an athlete anymore – this was an undesirable outcome, but he felt that it had got to the stage where he was left with no option. Acknowledged the difficulties knowing when training can be stopped, as you want their exercise to be controlled to an extent, and also for them to have the social support of their friends – stopping training and this takes that support away & the chances are they will continue to exercise anyway, but it will be unmonitored. This I felt was a particularly interesting point as he also noted that the affected athletes said to him ‘well if you don’t coach me I’ll still continue to run anyway’, which perhaps created a greater level of concern for their safety. At times it felt more like a conversation than an interview, and I felt able to explore issues with the coach, without being too concerned about the schedule – rather I was able to explore the issues that were salient to this particular coach. As with the previous coach, he mentioned that the scenario was difficult, and particularly perhaps because he hadn’t had much time to think about it – this may be one of the issues of phone interviews, there is a tendency to expect a reply relatively quickly. The coach only required short prompts and little intervention from me to continue talking about his experiences. This was the longest interview (1hr 10mins), so I shall look forward to transcribing it!

16/08/2011

Interview 5 is now transcribed – it took about 2 days in the end, and still needs checking. It was interesting listening to it second time around. I felt like the conversation flowed, there were
perhaps a couple of occasions where the participant was able to talk about irrelevant topics, but it still produced a lot of interesting material about his experiences with eating disordered athletes, and how he thought it best to approach situations and prevent eating problems within his all-female athlete group, where eating problems were perceived to ‘spread’ quite quickly.

**Interview 6: Friday 26/08/2011 10.30am – (transcribed by 02/09/2011)**

Interview six was another lengthy one. This was perhaps because the coach was currently coaching an athlete with an eating disorder. The coach took me through the various steps that he had employed in dealing with the eating disorder. He was very willing to talk and the interview lasted over an hour. He didn’t seem as ‘afraid’ of tackling the eating disorder as some other coaches might have been – he seemed to have a number of contacts and ways of dealing with it, but not coaching the athlete didn’t ever seem to be an option. He mentioned the difficulties associated with persuading some athletes that they might have an eating problem and suggested that the athletics system in the UK was not conducive to supporting athletes who have ‘nearly’ made it. He was very keen to keep an athlete running even when suffering with an eating disorder, suggesting that it was better to be fit and unwell than unfit and unwell. Transcribing the interview was fairly difficult as he had a broad Scottish accent. I felt perhaps there were times when I said a little too much so I just need to take care to avoid this in the later interviews. The coach works within academia and has conducted qualitative studies of his own, and whilst they are not within this area, I got the impression he knew what was expected in terms of his replies – but he was willing to talk at length about his experiences, which was obviously very useful.

**Interview 7: Tuesday 13/09/2011 (Transcribed Weds 14/09/2011)**

This interview was with a throws coach who had had experience with eating disorders amongst his female athletes. Identified interesting image issues – female throwers have to appear relatively strong, particularly in the upper body which may not be attractive and is different to other females. I had some difficulty getting the participant to willingly open up and talk about the situation and experiences with eating disordered athletes. I think perhaps he was concerned about the athletes finding out he had taken part in the study, or concern over ethics, despite reassurance from me at the start of the study explaining that all participants would be kept anonymous. I felt like I had to do a lot of the talking and was perhaps too involved in the interview – I may have influenced his responses in the style of questioning I used. He did place quite a lot of emphasis on social support and providing the athlete with a training environment even if they were difficult to persuade to seek help. However, the majority of the responsibility for dealing with the disorder seemed to be placed with the parents rather than the coach – perhaps this is because he was working with under 18s the majority of the time – parental involvement was pretty high. I was a little disappointed with the interview in terms of the amount of information I could get out of the
coach, but perhaps this was due to a low level of involvement in the process once the problem had been identified.

**Interview 8: Wednesday 14/09/2011**

This coach seemed very well informed about eating disorders, the female athlete triad and signs and symptoms of ED – he admitted to doing a substantial amount of reading about it, and this was possibly due to an experience early in his coaching career as a coaching assistant – an athlete with a very serious condition was being coached by his mentor and the situation was not addressed as it should have been, felt he should have perhaps done more about it. The coach was very willing to talk through his experiences and stated his willingness to take part in research was in part due to having seen this condition up close and his hatred of another of his athletes getting into the same position – wants to find out more about how best to guide athletes and what coaches should be doing to prevent with and manage athletes with eating problems. I felt like I only had to provide short prompts and felt I approached the interview well prepared. I made a point of listening carefully to what the coach was saying instead of planning my next question, which gave the interview a better flow and it jumped around a bit less than previous ones. The interview was around an hour and it generated a lot of useful data – he touched on something that none of the other coaches mentioned, which was the taboo subject of disordered eating, menstrual function etc. amongst coaches and their athletes, and the difficulties in tackling such issues.

**Interview 9: Wednesday 05/10/2011 (Transcribed Thurs 6/10/11)**

This interview was fairly short. I think the coach was willing to talk about his experiences but seemed a little reluctant to go into detail. I ended up probing and after having transcribed it I’ve noticed that some of my probing was quite closed and perhaps did involve some rather leading questions. I should perhaps have focused more on open ended questions and asking the interviewee to tell me more about a particular situation or to expand on what they meant rather than giving them yes or no type questions. Despite this, I think the interview generated some really interesting data. The coach was very to the point and clear about what he wanted to say. There are definitely some new themes and codes that I hadn’t come across previously, reinforcing the need for another interview. He identified issues such as denial and secrecy of the athlete that complicated his role in identification and managing the athlete, and also mentioned quite significantly the difficulty of a male coach approaching a female athlete about these sorts of issues. He also mentioned the difficulties in getting through the system and getting to the point where the athlete could see a professional, describing it as lengthy and unknown territory. He also talked a bit about different types of training for ED athletes (similar to what an injured person might do), suggesting low impact training would be more appropriate – something not mentioned by any other coach.
Appendices

Interview 10: Wednesday 12/10/11 (Transcribed Friday 14/10/11)

This interview took about an hour. The coach had had a lot of experience with eating disorders or problematic eating, his first experience being 15 years ago. He seemed very proactive in the involvement of others and using objective measures to analyse body fat and highlight areas of concern. He noted the unwillingness of coaches to learn or perhaps be accountable for eating disorders in their athletes, perhaps due to the fact they are amateur coaches and can ‘do without the hassle’. He mentioned being shocked at the lack of knowledge of coaches at a regional level. The coach was very willing to talk about his own experiences. He seemed very confident in his ability to solve these issues, mentioning that where other coaches were reluctant to handle these athletes, he was able to ‘sort them out’ as such. It was an interesting as he had also had an experience with a male athlete who was unwilling to eat and mentioned that his performance and sporting prowess was never the same after recovery from the disorder.

Interview 11: 15 Nov 2011

The final interview was with a female coach who had had experience of disordered eating among the female runners and jumpers that she was involved in coaching. The coach was clear that once a potential eating disorder had been identified, there were others such as parents and medical staff who were more instrumental in the recovery process. All of the issues that the coach raised with regards to identification had been identified in the previous interviews. The coach described having little influence over athletes where their eating behaviours were concerned, and struggled to explore eating issues with athletes. It seemed that the coach was reluctant on occasion to raise the issues of eating, diet and nutrition. On analysis of the interview, it was deemed that no new themes had emerged, and thematic saturation had been achieved. No further coaches were subsequently recruited for the study.
Appendix K: Reflective Diary (Studies 6 and 7)

This diary is designed to help me to reflect on my interview technique and my emotional responses to the interviews. I have provided a summary of the salient and important points that were raised in the interviews to facilitate the analysis.

Interview 1: 18th April 2012

I found this first interview quite tricky as I wasn’t sure whether the interview schedule would be appropriate and I was concerned about how far I could probe the participant with regards to their eating disorder history and their emotional responses to such questioning. The participant was concerned about the length of the interview from the start, which made me feel rushed and not able to explore her responses as much as I would have liked to. I was concerned over causing distress to the participant, who was an inpatient on an eating disorders ward. I think the environment also contributed to this as the interview took place on the ward, and it was a bit difficult for both of us to relax and for me to remain emotionally detached from the patient. Despite this, the participant revealed some interesting perceptions of her athletics coach, who she felt focused only on the elite athletes in the group and tended to ignore others. From my perspective, exploring this a little further would have been helpful to determine its impact on her eating behaviour. The interview was relatively short at just under half an hour. I think whilst it is important for me to be careful as to how far you push the participant to talk about a topic, ensuring that I get everything I can out of an interview situation is important as I am unlikely to get the opportunity to talk to this participant about her experiences again.

Interview 2: 25th June 2012

This second interview went considerably better than the first, possibly because there were no time pressures and constraints. The participant was also very articulate and her thoughts about her eating disorder experiences were relatively matter of fact. She described a good relationship with her coach, with few expectations of them in terms of dealing with it. She was keen for the coach to be aware of the situation and to perhaps understand days when she might not be able to train as well, but not necessarily to be overly involved in it. She noted a similar level of understanding was important amongst her teammates too. I noticed that the participant felt obliged to be a good athlete role model for others and a lot of her emotional discomfort came from disrupting this. It was interesting the pressures that she felt and the image that she felt she had to portray as an elite athlete. Interview technique wise, I felt like this interview went well and the participant responded well to the questions I asked. It can get a bit confusing, particularly with time scales when participants are relaying information about their ED and their sport but I think it is
important for me to be aware what the focus of the interview is and it is not always necessary to worry about knowing exact timescales.

**Interview 3: 29th June 2012**

I found this interview fairly tricky. Although the participant fell within the age range for the study, she was extremely timid and it was difficult to get long responses or a lot of information from her. I think she was very concerned about saying the wrong thing. I tried to make sure I was as sensitive as possible and recognised quite quickly that my approach to questioning her would have to be slightly different to the previous interview, where the participant was fairly comfortable in talking about her disorder. This participant clearly loved her sport and she suggested that there were some pressures from coaches to look a certain way. However there were also coaches that tried to provide support for the athlete when they noticed that she had lost weight. The participant said that she would have liked more information about nutrition from a respected source rather than just from the coach or her parents. She suggested that setting weight targets wasn’t particularly helpful and thought that total removal from sport was difficult and potentially unhelpful to her recovery. The pressures of competing in revealing clothing was suggested, as was the influence of older athletes in the development of dieting and eventually her eating disorder. Whilst the interview wasn’t really long (around 50 minutes) I feel that I was able to elicit as much information as possible from this participant, particularly in the beginning where I was concerned over the one-word and limited responses.

**Interview 4: 18th July 2012**

This interview also lasted about an hour. This interview was particularly complicated as the coach turned out to be the athlete’s carer after the athlete had left home. This made objective assessments of the coach involvement quite difficult and questioning around the topic quite sensitive. It seems that the ED onset was related to trauma and stress at the athlete’s family home and was an acute rather than a chronic case. The participant disclosed having been previously abused, although I had been previously warned about this by the clinician. As this was not the focus of the interview, I felt it was important to acknowledge it but also not to dwell too long on the event or the issues surrounding it. After the interview I felt like I had managed my emotions surrounding the disclosure relatively well and it had not affected the flow of the interview too dramatically. However I found it helpful to chat through the case with the therapist afterwards to debrief appropriately.

The coach stopped the athlete from training at one point and the athlete said that little rationale or information of the duration of stopping was given – and that this was quite difficult to deal with. The athlete described the positive impact that sport had on her life and suggested that this was helpful in her recovery.
Appendices

Interview 5: 26th July 2012

The interview went well. The participant had good insight into her disorder and the reasons behind the causes and trigger factors, despite currently suffering. The participant described a good relationship with her coaches although their involvement in her treatment seeking or disorder was relatively minimal. She described feeling like her identity still revolves around being an athlete, despite being too ill to engage in weight bearing exercise. She described a relatively strong focus on food for performance and an almost epidemic of eating disorders within female athletes in the sport at the time. She suggested that additional support and education for coaches would be good as they often don’t realise the influence they have over impressionable teenagers and adolescents who are keen to perform. The interview went well as the participant was willing to disclose their experiences honestly and openly and had a good level of insight into their disorder. I felt comfortable with asking additional questions about her treatment seeking experiences although it was difficult when she expressed desperation about where to go next or what to do – I am not in position to provide advice but it was quite difficult to hear about her struggles and not to be in position to provide help or support.

Interview 6: 14th August 2012

This interview was with a male participant, which changed the dynamic of the interview slightly. The participant was very willing to chat once I had reassured him over the confidentiality of what he would talk about and that his comments were anonymous. He also had some interesting thoughts on experiencing an eating disorder as a male athlete and the issues with detection that face coaches for male athletes. He suggested that there was not enough information either for athletes or for coaches over the issue of nutrition and was frustrated with gym managers and personal trainers who don’t intervene when a user is clearly doing themselves harm. It was interesting to note that this particular participant did not like to use the words eating disorder or indeed apply such labels to himself, so it was important as an interviewer to pick up on this relatively quickly. When he did use the words he visibly retracted and it took him a moment or two to recover. He referred to a number of phrases and common comments that coaches make which he suggested could have an unforeseen impact on an athlete. The trauma of having a career ending injury appeared to be a trigger factor for the eating disorder and the lack of support that surrounded that end to his gymnastic career. However, the participant believed the injury could have been prevented with sufficient nutrition information prior to that.

Interview 7: 23rd August 2012

This interview was extremely long, lasting over two hours. Often the participant wandered well off topic and it was difficult for me to reign them back in to topics that were more salient to the interview schedule. The participant had been involved in organised sport from a young age
although her involvement in sport since school had waned and she was more involved in gym based exercise or cycling. Whilst her thoughts and input were interesting and of some relevance, it will be important to consider the emerging themes from this interview and to decide whether her experiences are recent enough to include her as a participant for this study. As an interviewer, I think I need to be a bit firmer in ensuring that the participant doesn’t go too far off topic and to ensure that the interview stays on track.

**Interview 8: 2nd October 2012**

This interview was fairly straightforward. The participant was very willing to chat through her experiences of her eating disorder in relation to her sporting involvement. I got the impression that the participant had relayed her experiences a number of times and was relatively used to talking about it. This made it a little tricky as I wanted to get responses to my specific questions, rather than questions that she had previously. After the first few minutes this became easier and she was more open to acknowledging the questions directly. She had strong opinions on coach education and the influence of a coach in the development of her eating disorder. She also had some interesting thoughts on the potential influence of athlete education with regards to the effects of long term under-eating. The participant suggested that on quitting her sport the eating disorder had subsided, which was interesting to hear. It will be important to consider whether this affects her inclusion in the overall study and an assessment of the themes in comparison to the other interviewees will be necessary. The interview lasted nearly an hour and a half.

**Interview 9: 30th October 2012**

I think I am getting better at knowing how far I can question participants on their experiences of eating disorders and the relative involvement of their coach. This participant was an athlete with early onset anorexia and very matter-of-fact about her eating disorder despite currently suffering. She mentioned overhearing critical comments from her dance teacher about another dancer – it is interesting that this is an indirect comment that encouraged her to think about her own weight. This also happened at a very young age (9 years old) so perhaps salient that she could still remember it. She expressed significant frustration with the perception that eating disorders are all about weight loss, and suggested that unless you’re extremely thin, then coaches and teachers wouldn’t necessarily accept that an athlete had a problem. She described scenarios when teachers and coaches ignored her eating disorder and also how they may have inadvertently worsened it through weight-related comments. It was an enlightening interview as it showed a difference in the approach between dancing teachers and gymnastics coaches as to whether to tackle the problem or to ignore the issue.

With regards to my interview technique, this interview was relatively straightforward as the participant was very open and honest. I think sometimes I needed to perhaps think through my
questioning a bit in advance of asking the question. It is also important not to ask leading questions and to ensure that the questions are as open as possible to give the participant the opportunity to reveal what is salient to them. The interview lasted about an hour, which is relatively typical of the participants thus far.

**Interview 10: 15th November 2012**

This interview went well, the participant was relatively open and willing to disclose her experiences of her eating disorder. We chatted for some time and I was pleased with the general format of the interview and my questioning technique. The participant had been in treatment for some time, and was clearly frustrated that she wasn’t making as much progress as she would like. She raised some interesting perspectives on the specificity of treatment for athletes, and suggested that the staff didn't always understand her need to exercise, as an athlete. She disclosed particularly struggling with not being allowed to exercise. It was evident that her motivations for disclosing her eating disorder were performance directed, and due to concerns about being left out of the team. However, the athlete had few expectations of her coach with regards to seeking support and treatment, liaising mainly with her family. This is interesting, as it suggests the coach does not have an emotional support role to play in this case, but rather their role is performance centred, with limited impact on the athlete outside of the sporting context.

**Interview 11: 20th November 2012**

The participant had not been able to fill in the questionnaires before this interview, so was able to do this at the start. I always feel a bit uncomfortable when participants do this, and make sure I reassure them that their responses are anonymous. I specifically take a folder with me to put the questionnaire straight into. The participant was very willing to chat through her eating disorder experience. The questioning was able to be quite extensive as a result. She lacked a little bit of insight into her disorder on occasion; her disclosure experiences were quite traumatic and she was unwilling to seek treatment initially. She struggled with her identity as an athlete within support groups, and described feeling like the odd one out on several occasions. She felt that the one-to-one treatment she was receiving was more effective than the group sessions she had attended, because of the lack of specificity of such sessions.

**Interview 12: 9th January 2013**

This interview was with a male athlete. He was very keen to chat, but tended to be a bit vague in his responses on occasion, which meant quite a bit of probing and questioning on my part. He described some of the challenges he faced in recognising his disorder, and in subsequently disclosing it. His major concerns were to do with his health, as opposed to his athletic performance. He suggested some ways to prevent eating problems (primarily through education
processes) and perhaps ways in which athletes could be helped to recognise when they have eating problems. I feel like my interview technique is improving all the time, and I feel more confident in allowing silences and in giving the participants time to think through their responses.

Interview 13: 19th March 2013

This interview was a lengthy one, taking nearly an hour and a half. At times the participant went off topic, but it was probably a reflection of the nature of her chronic and complex eating disorder. The participant went into a lot of detail about her eating disorder symptoms and the process of her recovery, which was ongoing. This was a chronic case, where the participant had struggled with her eating disorder for some time. Her experiences of seeking treatment were particularly interesting, raising issues to do with athlete motivation to seek help, versus the prospect of retaining the eating disorder. It was evident that the eating disorder had an emotion regulatory function, which the athlete was unwilling to part with. Her coach played an important role in prompting her to seek support, and in supporting her throughout the treatment process. This was interesting that the coach had such an active role, as this had not come across in many of the previous interviews.

Interview 14: April 22nd 2013

This athlete was very emotional at times during the interview, and was clearly frustrated with her lack of progress in recovery. This made it difficult for me at times, however I made sure that she was aware that it was a voluntary interview, and that we could stop at any time if she felt uncomfortable. She did complete the interview in the end, but was clearly frustrated with her treatment plan. The athlete seemed to struggle most with stopping exercising whilst in treatment. Despite this, she recognised that she had little control over her exercise and that however much she wanted to exercise, it wasn’t going to help her get better. She raised some interesting points with regards to the lack of sports specific nutritional support that was available on exiting treatment – suggesting a generic nutrition plan for all patients on leaving the service.

Interview 15: April 22nd 2013

This interview was quite challenging, as the responses from the athlete were quite vague. She struggled to recall the experience of her eating disorder, particularly during the acute phase, which was difficult to manage in questioning and probing. It is interesting however, as it does suggest cognitive function is depressed during the acute phase of an eating disorder. Many of the same experiences and challenges emerged in this final interview, such as the pressures of maintaining an ideal weight and shape for optimal performance, and a focus on weight within the sporting context. The athlete referred to difficulties in coping with an exercise ban.
Appendix L: Interview Schedule (Studies 4 and 5)

**Questions and Prompts**

Age of participant; coaching history: sport and disciplines coached, length of time coaching, hours of coaching each week, age and level of athletes currently coaching. Current weight monitoring strategies and educational experience of disordered eating.

Could you describe your experiences with an athlete with an eating problem?

Prompts: How did you know the athlete had problems with their eating? What had you noticed that made you think the athlete might have an eating problem?

What did you do when you suspected an eating problem?

How confident did you feel in identifying this as an eating problem?

Prompts: How certain were you that it was an eating problem? What was it that made you confident that it was/was not an eating problem? What do you look out for when identifying eating problems in athletes? How successful is this?

Did you experience any difficulties in identifying the eating problem?

Prompts: How did you decide whether it was an eating problem? Did you approach anyone else to help you determine whether or not it was an eating problem? Was there anything that helped you to identify an eating problem, or that would have been useful to know about/have access to?

Can you recall any particular feelings or emotions when you suspected an eating problem?

Prompts: What was your initial reaction? How do you feel about it now?

Did you approach or challenge the athlete about their eating problem?

Prompts: If yes, can you describe the interaction? Was it a success? If no, why? How did you feel about asking the athlete about their eating? Was the athlete willing to talk to you?

What action (if any) did you recommend to the athlete, or take yourself?

Prompts: Did the athlete readily accept or acknowledge their eating problem? Did you approach anyone else to for support? Did you know where to seek help from? With hindsight, was there anything that would have been useful to know about/have access to
Disordered eating scenario

Part 1: Sarah is a talented 18 year old female at your club. She works extremely hard both at her university course and in athletics, and has recently expressed a desire to do additional training beyond her current schedule. She says she wants to succeed and will do whatever it takes. Her performances on the track have been good and she has a chance of being selected to compete for the GB Junior team this year. You notice that Sarah has lost weight in the last few weeks and that she has become more rigid about her diet, excluding most carbohydrates.

Part 2: Three months later and Sarah’s performance has dropped considerably. Her weight has continued to fall and she complains of feeling tired a lot. She admits to you that she has not been eating properly and sometimes makes herself sick after mealtimes.

After each part of the scenario, coaches were asked: How comfortable would you feel in tackling these issues? What would you say to the athlete and what advice would you give?
Appendix M: Interview Schedule (Studies 6 and 7)

Questions and Prompts
Could you give me a bit of background about your involvement in sport?
Prompts: What sport(s) have you participated in; how did you get involved in it; what level have you/are you currently competing at; what age did you start competing; what training did that involve? Were you coached? How long were you coached for, and by whom (coach status)?

Could you tell me a bit about your eating disorder history?
Prompts: When did it develop? Any known triggers? How was it (if at all) related to sport or exercise involvement? Describe exercise behaviour and performance pre and post development of eating disorder. Were there any aspects of the sporting environment that they felt may have contributed to their eating disorder?

Could you tell me a bit about your relationship with your coach?
Prompts: Quality of the relationship, closeness, goals, perceived compatibility. Perception of coach input for training and for other elements of life (social, nutrition, academic).

Did your coach, or any other sports professionals, challenge or ask you about your eating behaviours at any point?
(If yes) Could you describe what happened for me? What was your reaction to this? (How did you feel, influence on eating, treatment seeking?) What did you find useful or helpful in their approach? What do you think they could have done better? Did they have any involvement in your treatment seeking?
(If no) Why do you think they did not challenge you about your eating behaviours?

Did your athletic peers challenge or ask you about your eating behaviours at any point? (If yes) Could you describe what happened for me? What was your reaction to this? (How did you feel, influence on eating, treatment seeking?) What did you find useful or helpful in their approach? What do you think they could have done better? Did they have any involvement in your treatment seeking? (If no) Why do you think they did not challenge you about your eating behaviours?

Could you tell me about your treatment seeking experiences? Prompts: How, when and why did they seek treatment? Any concerns over seeking treatment as an athlete and the effect on their sports performance? How has your sporting background been incorporated into your treatment programme (if at all)?
Appendix N: Audit trail - Transcription, themes & subthemes (Studies 4 & 5)

August - November 2011
Initially I wasn’t sure how to go about analysing my data. I have chatted to some of the PhD students who have done thematic analysis before, and had a look at the Braun and Clarke position paper on using thematic analysis in psychology. This was really helpful in guiding my first steps through the analysis. I started by transcribing the interviews as I did them, while they were still fresh in my mind, and jotted down some of the ideas and thoughts that occurred to me, to remind me to consider these during the analysis. Transcription takes a long time (!) but I think it will be really helpful in providing some direction to the analysis, and I feel like I know my dataset really well now.

November 2011 – February 2012
I have downloaded NVivo and transferred my data into the software. I have started coding systematically, and I am coding line by line (assigning meaningful words or phrases to describe salient features of the text). As a result, NVivo highlights all instances of that particular code and it is easy to tell which codes appear frequently. I’m trying to make sure that I am coding consistently across the dataset. Sometimes it is useful to have a look back at my reflective diary to see what my initial thoughts were about the interview, and to make sure that this comes across in the coding. Coding line by line is very time consuming, particularly as there is so much information in the interviews.

February – May 2012
Over the past couple of months I have been trying to collate my codes into a meaningful structure. I have had several meetings with Jon and Caroline, showing them the coding framework as it currently stands. Whilst they appreciated the detailed nature of the codes, they were keen to develop a more interpretive approach with the data, as at the moment the codes feel very descriptive. I suppose that is the nature of the coding line by line. The next steps involved trying to make sense of the codes, and trying to group similar codes together. Whilst NVivo was a useful tool for the line by line coding, I felt it was easier to collate codes by hand. I found it difficult to know how to group the codes at times and developed several different potential themes and subthemes. My coding structure as it currently stands includes the following themes: “weight”, “nature of the eating disorder”, “barriers and issues”, “responsibility”, and “coach role”.

May-September 2012

I have been going back through the data to evaluate the coding framework that was presented in the last diary entry. In discussions with Caroline and Jon it was felt that there were a lot of themes, and that they didn't hang together particularly well. After a presentation of the findings to LUCRED staff and fellow PhD students, the feedback I received was that the results section was still quite descriptive, and that there was room for more interpretation with the data I had. I felt that it was necessary to go back to the data and try to adopt a more interpretive perspective, by considering the possible reasons for coach behaviours and attitudes, and also the potential implications. We developed second framework whereby the themes were split up into those that were relevant for coaches, clinicians and athletes, versus information that was just relevant for coaches, and then just athletes. The resulting structure was as follows:

1. Information for coaches, clinicians and athletes
   - Treatment
   - Enhancing motivation to change
   - Responsibility

2. Information for coaches
   - Identification and perception of eating disorders
   - Tackling the issue
   - Active versus passive coaches

3. Issues to address with athletes
   - Disclosure and treatment seeking behaviour
   - Perceived culture of thinness
   - Coach intervention

The issue with the current structure is that the paper is very long and it doesn't feel as if I am currently giving sufficient detail on some very important issues that were raised in the interviews. Caroline, Jon and I discussed splitting up the results into two chapters to allow for more in depth discussion and consideration of the findings.

September - November 2012

Caroline, Jon and I decided that it would be more useful to split the results into two chapters, to consider the findings relating to identification and management of eating problems separately. The revamped structure of the themes for the identification chapter was presented to Terry Dovey in my second year review. He raised some interesting issues with the themes as they currently stood, and encouraged me to go away and explore some of the points he had raised. For example, he suggested that coaches conceptualised eating disorders as anorexia nervosa – with limited knowledge of other types of eating disorder. This is something that I had picked up on, but it was not coming through strongly as a theme in the results. Terry questioned the use of the term
‘behavioural changes’, suggesting that coaches were actually heavily reliant on weight status of their athletes in detecting a potential eating disorder. It was really useful to have some input from someone not totally immersed in the project and I intend to spend some time thinking about the points he has raised.

**November 2012 – January 2013**

I have had another look through the data since the conversation I had with Terry. As a consequence, I have made some changes to the structure of the themes for the identification paper. The structure of the themes is now as follows:

1. Primary methods of identification
   - Changes to physical appearance
   - Signs and symptoms
   - Changes in training and performance
2. Secondary methods of identification
   - Objective methods
   - Talking to athlete peers
   - Considering potential explanations
3. Factors complicating the successful identification of eating problems in athletes
   - Communication
   - Coach factors
   - Athlete factors
4. Factors facilitating the successful identification of eating problems in athletes
   - Coach-athlete relationship
   - Involvement of others
   - Experience

This seems to make more logical sense to me. Caroline and Jon reviewed the revised results section and were keen to make sure it was as succinct as it could be, as at times it felt quite repetitive. I am going to consider how the results section could be presented in a tighter, more succinct way.

The responses chapter is also coming along well. Discussions were held with Caroline and Jon as to how to best frame the ‘response categories’. I discovered a nice link with the animal analogies used by Treasure and colleagues in the reactions of carers, and developed the following structure: “*Calm and collected Dolphin coaches, Avoidant Ostrich coaches and Anxious rabbit coaches*”. 
January – April 2013
The last couple of months have been in preparing the manuscript for a special edition on eating disorders in athletes in Psychology of Sport and Exercise. The themes have been revised to reduce the length of the overall paper and to present the findings as succinctly as possible. The thematic structure is as follows:

1. Primary methods of identification
   - Physical indicators
   - Eating attitudes and behavioural indicators
   - Social indicators
   - Performance indicators.

2. Barriers to successful identification of disordered eating in athletes.
   - Coach specific factors
   - Athlete specific factors
   - Communication

3. Factors facilitating the successful identification of disordered eating in athletes
   - Coach-athlete relationship
   - Support from others
   - Experience

With regards to the responses chapter, Caroline wasn’t keen on using the animal analogies, and thus we formulated an alternative way of grouping the coach responses. The following categories were used “Resourceful”, “Avoidant” and “Anxious”. A final theme of “challenges to managing eating problems in athletes” was also proposed.

April – November 2013
I have been busy submitting and revising the two coach papers. The feedback we have had from reviewers has been incredibly helpful in refining and revising the two papers. The thematic structure for both papers has not changed significantly, but the level of interpretation of the interview data has improved and both chapters now offer a more insightful commentary on the data. For the identification paper, a suggestion that the results and discussion were presented together has enabled this interpretation to occur in concordance with the presentation of the data itself. It is really interesting to look back and see how far the two papers have come from the initial ideas and thoughts that I had with regards to the coding and preliminary thematic structure.
Appendix O: Audit Trail – Transcription, themes & subthemes (Studies 6 & 7)

Transcription (April 2012 – April 2013)

The data collection for this study lasted just over a year, due to the specificity of the participant group and the difficulties with recruitment. Over the course of the year I have been transcribing the data, maintaining a reflective diary. The broad research questions were generated as follows: (i) How do athletes experience disclosure of an eating disorder? (ii) How do athletes experience seeking and engaging in treatment for an eating disorder, and what challenges do they face? Given that we were interested in understanding how athletes experienced disclosure and treatment seeking, and perhaps to explore some of the differences between participants, Interpretive Phenomenological Analysis (IPA) was investigated as an appropriate method of analysis.

I have spent some time reading about IPA (Smith, Flowers & Larkin, 2013), as I have limited experience in using this form of analysis. It was agreed with Caroline and Jon that this form of analysis might be most appropriate, although it was acknowledged that it would be very time intensive. The theoretical background of IPA seems to sit well with my philosophical position of critical realism. It is phenomenological, and therefore places emphasis on the lived experience of the individual, but also recognises the role of the researcher in interpreting and questioning their accounts of their experience. The first phase of IPA involves reading and familiarising oneself with the data. However, unlike thematic analysis, IPA tends to be conducted on a case by case basis. Therefore, the initial focus was on one participant at a time, rather than the entire dataset.

January – March 2013

I have been conducting some early analysis with the interviews that I have completed. I have spent a lot of time reading and re-reading the data, and making some notes with regards to my initial feelings and thoughts about each one. I am hoping this will help when it comes to the analysis. As opposed to thematic analysis, coding within IPA is not normally conducted on a line by line basis, but rather focuses on the salient features of the text. IPA has fewer ‘rules’ with regards to the coding procedure, which I am enjoying. I have, however, maintained quite a structured focus to recording these initial thoughts and ideas by recording my notes in a table, so that I can quickly pinpoint which part of the text I am referring to. I think it will help with comparison between cases later on, and will hopefully mean picking out quotes for the final manuscript will be considerably easier. Again, in contrast with thematic analysis, rather than a purely descriptive focus for coding, IPA tends to take a more interpretive approach, so incorporating my thoughts and ideas as to how and why the participants have described their experiences in this way. An example from these reflective notes, highlighting the exploratory and
conceptual comments made during the analysis, has been included (Table 10.1) with particular words and phrases emphasised for analysis purposes.

March – June 2013

Conceptual issues and interpretation is becoming more important in these stages of the analysis, so the analysis has moved beyond the local level to consider broader issues. IPA stresses the importance of analysing each case independently in the early stages, before looking for common patterns across the dataset. A series of themes are being developed for each case. These themes are developed in relation to the transcript, but also in consideration of the exploratory and conceptual commentary. The themes for each case are then listed, so comparisons can later be drawn. For example, some of the themes to emerge for participant 1 are presented below (Table 10.2)

Appendix O, Table 1: Example of reflective commentary

<table>
<thead>
<tr>
<th>Line</th>
<th>Text</th>
<th>Reflective comments for consideration.</th>
</tr>
</thead>
<tbody>
<tr>
<td>141-</td>
<td>Comments weren’t really made and I mean just…I don’t know, now I think about it, my family would just like make jokes about my body, but they were just jokes.</td>
<td>Contradictory – comments were made, athlete prompted to recall specifics. Concern over apportioning blame to family? Feels quite protective of family behaviours. Differences between how the comments were intended and how they were received? “Oh you’ve got like meaty”….and then like grab my thigh or something like, “oh you’re getting some meat on there”. But I never really took it that badly …yeah. Recall of actions and comments of family with regards to weight – suggests potential lasting impact? Knows that not intended to be hurtful, but hints that perhaps they were.</td>
</tr>
</tbody>
</table>

June – September 2013

Data collection has now finished, so it is full steam ahead with the analysis. Over the past couple of months I have been trying to draw comparisons between the themes drawn for the first few interview and the subsequent cases that I have considered. These themes have provided a basis from which to direct the analysis of further cases, although I need to be careful that the individual elements of the later cases are still allowed to emerge when using these themes as a framework. If new themes do emerge in these later cases, then I will need to go back through the initial cases and evaluate the commentary and transcripts for instances of these themes. I’m
surprised by how long this process takes – it is certainly challenging, but I appreciate the richness of the data and the need to fully interpret and understand the data.

Appendix O, Table 2: Table of super-ordinate themes and themes from one athlete participant

<table>
<thead>
<tr>
<th>Superordinate theme</th>
<th>Theme</th>
<th>Key phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motives for disclosure</strong></td>
<td>Performance</td>
<td>‘being the best I could be’</td>
</tr>
<tr>
<td></td>
<td>Appearance</td>
<td>‘hypersensitive to changes’</td>
</tr>
<tr>
<td></td>
<td>Importance of maintaining athletic identity</td>
<td>‘that’s part of who I am’</td>
</tr>
<tr>
<td></td>
<td>Pressure as a role model</td>
<td>‘you have to live up to it’</td>
</tr>
<tr>
<td></td>
<td>Recovery</td>
<td>‘you have to do it yourself’</td>
</tr>
<tr>
<td></td>
<td>Explanation</td>
<td>‘understanding’</td>
</tr>
<tr>
<td></td>
<td>Cognitive behavioural changes</td>
<td>‘clouded judgment’</td>
</tr>
<tr>
<td><strong>Eating disorder experience</strong></td>
<td>Interpersonal relationships</td>
<td>‘they don’t know what to say’</td>
</tr>
<tr>
<td></td>
<td>Sports performance</td>
<td>‘feeling bloated and bad’</td>
</tr>
<tr>
<td></td>
<td>Symptoms</td>
<td>‘sick’ ‘full’ ‘lethargic’</td>
</tr>
<tr>
<td></td>
<td>Relevance</td>
<td>‘extreme’</td>
</tr>
<tr>
<td></td>
<td>‘generic’</td>
<td>‘Lack of understanding’</td>
</tr>
<tr>
<td><strong>Treatment challenges</strong></td>
<td>Sourcing support</td>
<td>‘time’ ‘difficulty’</td>
</tr>
</tbody>
</table>

**September–November 2013**

I have been trying to pull together a final thematic framework for the analysis following comparison across the full dataset. The thematic framework as it currently stands is provided below in Table 3. This covers a lot of data – I’m not sure yet if it is too much. I have started trying to write up the results section of this work. I suggested to Caroline and Jon that it would be useful for some secondary coding to be conducted with the data, to provide some validation to the codes developed. I have enlisted the help of a student who is willing to help with secondary analysis, so it will be interesting to see if the outcomes of the analysis are similar. She has only been asked to look at a small subset of the data, but has been fully briefed on the analysis process.
Appendix O, Table 3: Thematic Framework October 2013

<table>
<thead>
<tr>
<th>Superordinate theme</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosure and help seeking</td>
<td>Performance motives (motives for help seeking)</td>
</tr>
<tr>
<td></td>
<td>Athletic identity (fear of exclusion)</td>
</tr>
<tr>
<td></td>
<td>Direct intervention (peers / coach / other; facilitated help seeking)</td>
</tr>
<tr>
<td></td>
<td>Expectations of others</td>
</tr>
<tr>
<td>Recovery</td>
<td>Therapist client relationship</td>
</tr>
<tr>
<td></td>
<td>Perspectives of appropriateness and value of treatment;</td>
</tr>
<tr>
<td></td>
<td>Sport goals, motivation and readiness to change</td>
</tr>
<tr>
<td></td>
<td>Transition support</td>
</tr>
<tr>
<td></td>
<td>Knowledge and awareness of condition</td>
</tr>
<tr>
<td>Perspectives on exercise during recovery</td>
<td>Compulsive exercise versus healthy exercise</td>
</tr>
<tr>
<td></td>
<td>Impact on recovery</td>
</tr>
</tbody>
</table>

**November 2013 - January 2014**

The richness of the data has prompted me to consider splitting the results into two sections – one to do with disclosure, and one to do with treatment issues. I felt that there was just too much information to justify presenting only part of it in one chapter. The treatment issues are particularly pertinent and could offer some useful insight for clinicians and therapists – so perhaps we also need to consider different avenues for publication of these two chapters. Discussions with Caroline and Jon led to a similar conclusion, as the initial results section was extremely lengthy and unlikely to be publishable in its current format. Indeed, in comparing the cases for the disclosure element, I noticed some clear similarities and differences in the dataset. Those who self-initiated disclosure of their eating disorders described a completely different experience to those who were approached about their eating problems. I felt it was important to reflect these differences in the analysis and subsequent write up.

**January to March 2014**

The student has finished analysing the subset of cases. We have had a discussion about her findings, which were on the whole very similar to the themes that I had pulled out. She had lots of different superordinate themes in comparison to those that I had developed, but I think perhaps this reflected an earlier stage of analysis, and she was yet to consider how the themes could be
grouped together. In review of this secondary analysis, few changes were made; hence the final framework for the disclosure element is as follows:

**Self-initiated disclosure**
- Performance motives
- Recovery motives
- Facilitating treatment

**Facilitated disclosure**
- Negative disclosure experiences
- Barriers to disclosure

The disclosure chapter distinguishes between those who disclosed their eating disorder voluntarily, in comparison to those who were prompted to disclose. This was an important distinction that emerged through the analysis. The three final superordinate themes that were identified for athlete experiences of treatment were as follows:

**Challenges to seeking treatment**
- Practical issues
- Psychological issues

**Motivation to engage with treatment**
- Perceived relevance and value of treatment programme
- Recognition of athletic identity by staff
- Coach involvement

**The impact of exercise on recovery.**
- The nature and function of exercise
- Transition into treatment (exercise restriction)
- Transition out of treatment (exercise reintroduction).

**March to July 2014**

I have been busy preparing the disclosure paper and the recovery and treatment paper for submission. The disclosure paper has been submitted to the Journal of Sport and Exercise Psychology, whilst the recovery and treatment paper has been submitted to the International Journal of Eating Disorders. I am hoping that the experience of submitting these papers will be useful in refining and strengthening the current manuscripts.