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**THE PREVALENCE AND PSYCHOSOCIAL CORRELATES OF
BRITISH ATHLETES' EATING PSYCHOPATHOLOGY**

by

Vaithehy Shanmugam

Doctoral Thesis

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To my mum,

“If the whole world were put into one scale, and my mother in the other, the whole world would kick the beam”.

(Lord Langdale)

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Abstract

Eating disorders pose long-lasting physiological and psychological consequences, and have one of the highest mortality rates amongst mental illnesses (Harris & Barraclough, 1998). In recent years, athletes have been frequently identified as at more risk of developing eating disorders, and problematic eating attitudes and behaviours than the general population (e.g., Sundgot-Borgen & Torstveit, 2004). Athletes with eating disorders not only risk compromising their performance, but also their health and general wellbeing (Currie & Morse, 2005). Therefore, the identification of the prevalence, as well as the potential factors that is likely to contribute to eating disorders in athletes present a valuable avenue for research.

The first study of this thesis examined the prevalence of potential eating disordered cases amongst a sample of elite, developmental, and recreational British athletes, as well as a control group of British non-athletes. Gender and sport type differences *between* and *within* these aforementioned performance standards were also examined in this study. Results demonstrated that while recreational athletes and non-athletes reported greater disturbed eating psychopathology, there were no significant differences in the prevalence of probable cases of eating disorder between elite, developmental, recreational, and non-athletes. However, there was a trend for a higher number of non-athletes and recreational athletes (males and females, regardless of sport type) to be classified as potential cases with clinical eating disorders. In addition, a higher number of females from the elite and non-athlete performance standards were classified as eating disordered than their respective male counterparts. Thus, these findings provide evidence to suggest that eating disorders pose a cause for concern in less competitive athletes and those that do not engage in organised sport at all.

Guided by the established maintenance factors associated with eating disorders within the general population (see Fairburn, Cooper, & Shafran, 2003), Studies 2 and 3 reflect a series of cross-sectional investigations aimed to test the association between a range of interpersonal difficulties and eating psychopathology. These studies were designed to fill the

gap in the current eating disorder literature by examining multiple pathways between both situational (i.e., relationship quality with parents, coaches, and teammates) and dispositional interpersonal difficulties (i.e., attachment styles) and eating psychopathology via the mediating variables of perfectionism, self-esteem and depression. Mediation analyses in Study 2 revealed that relationship quality with parents and coaches as defined by social support, interpersonal conflict, and insecure attachment styles were indirectly related to athletes' eating psychopathology via the mediating roles of self-critical perfectionism, self-esteem, and depression. However, the quality of relationship with teammates was not associated to athletes' eating psychopathology.

Study 3 further examined the association between eating psychopathology and situational interpersonal difficulties (i.e., relationship quality with mother, father, and coaches), as well as dispositional interpersonal difficulties (i.e., social anxiety and loneliness) among a sample of athletes and non-athletes. Mediation analyses revealed that the quality of the relationship with the father, and levels of loneliness were indirectly related to athletes' eating psychopathology via the mediating role of depression, while social anxiety was found to be both directly and indirectly related (via depression) to athletes' eating psychopathology. In the case of non-athletes, the quality of the relationship with both the mother and the father, levels of social anxiety and loneliness were indirectly related to eating psychopathology via the mediating role of depression, self-esteem, and self-critical perfectionism. Furthermore, this study provided evidence to suggest that dispositional interpersonal difficulties may be more robust independent predictors of athletes' and non-athletes' eating psychopathology than situational interpersonal difficulties (i.e., relationship quality with significant others). Collectively these studies suggest that the psychosocial mechanisms hypothesised to be involved in eating disorders within the general population closely resemble that of athletes.

Employing a prospective research design, Study 4 examined the predictive role of situational and dispositional interpersonal difficulties in athletes' eating psychopathology. Conducted over a 6 month period, the findings of this study revealed that only situational interpersonal difficulties as reflected in the quality of the relationship with coaches and teammates were associated to athletes' eating psychopathology, over and above their initial eating psychopathology. Moreover, the study highlighted interpersonal conflict within the coach-athlete relationship as the only independent predictor of athletes' eating

psychopathology. Therefore suggesting that conflict with the coach should be considered as a potential risk factor in the development of eating disorders amongst athletes.

The final study tested the main constructs underlying the transdiagnostic cognitive behavioural theory of eating disorders (Fairburn et al., 2003) within an athletic population. Results revealed that elevated eating psychopathology may arise from an interaction of “interpersonal difficulties”, low self-esteem, high levels of self-critical perfectionism, and depressive symptoms. Moreover, findings of this study demonstrated that the tested model is invariant across athletes’ sport type and performance standard, but not across gender. Thus suggesting that the psychosocial processes involved in eating disorders are the same regardless of the type of sport, and the performance standard that an athlete competes in.

Overall, the findings of the current research revealed that while the prevalence of eating disorders may be considerably lower within the British athletic population than the general population, there is still cause for concern, given the high prevalence detected in recreational athletes, as well as the high number of competitive athletes engaging in inappropriate compensatory weight control behaviours (i.e., excessive exercise and self-induced vomiting). Moreover, the results of the latter studies suggest that psychosocial factors are important and pertinent factors to consider in the aetiology of eating disorders amongst athletes. As a whole, this thesis makes a significant contribution to furthering our understanding of the prevalence and psychosocial correlates of eating psychopathology amongst British athletes.

List of Publications Arising from this Thesis

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Table of Contents

Acknowledgement.....	i
Abstract.....	iii
List of Publications.....	vi
Table of Contents.....	vii
List of Tables.....	xii
List of Figures.....	xv

INTRODUCTION

Chapter 1: Eating Disorders: Prevalence, Risk Factors, and Correlates.....	1
1.1. What are Eating Disorders?.....	1
1.1.1. Anorexia Nervosa.....	2
1.1.2. Bulimia Nervosa.....	2
1.1.3. Eating Disorders Otherwise not Specified.....	3
1.1.4. Subclinical Eating Disorders and Disordered Eating.....	4
1.2. Limitations of the DSM-IV Classification System.....	4
1.3. Prevalence and Incidence of Eating Disorders amongst the General Population.....	4
1.3.1. Who is at Risk in the General Population ?.....	8
1.4. Prevalence of Eating Disorders amongst Athletes.....	9
1.5. Methodological Issues.....	13
1.5.1. Classification and Measurement Problems.....	13
1.5.2. Methodology and Sample Selection.....	13
1.6. Recommended Guidelines for Prevalence Studies.....	14
1.7. Gold Standard Study.....	15
1.8. Who is at Risk in the Athletic Population?.....	15

1.8.1. Gender.....	15
1.8.2. Sport type.....	17
1.8.3. Competitive Level.....	21
1.9. Risk Factors and Correlates of Eating Disorders in the Athletic Population.....	23
1.10. Risk Factors and Correlates of Eating Disorders in the General Population.....	27
1.11. The ‘Transdiagnostic’ Cognitive-Behavioural Theory of the Maintenance of Eating Disorders.....	32
1.11.1. Core Psychopathology	33
1.11.2. Clinical Perfectionism.....	35
1.11.3. Low Core Self-Esteem.....	39
1.11.4. Mood Intolerance.....	44
1.11.5. Interpersonal Difficulties.....	48
1.12. Evidence Supporting the Utility of the Transdiagnostic Cognitive Behavioural theory of Eating Disorders.....	65
1.13. Limitations of the Transdiagnostic Cognitive Behavioural Theory Of Eating Disorders.....	66
1.14. Moving Beyond the Current Research into Eating Disorders amongst Athletes: Rationale for Thesis.....	70
1.15. Broad Thesis Aims.....	75

METHODOLOGY

Chapter 2: Methodology.....	79
2.1. Design.....	79
2.2. Participants.....	79
2.3. Recruitment Procedure.....	82
2.4. General Procedure.....	83
2.5. Self-Report Psychometric Measures.....	84

2.6.	Data Analysis.....	91
2.7.	Ethical Considerations.....	104

STUDY 1

Section outline.....	106
----------------------	-----

Chapter 3: The Prevalence of Eating Disordered Psychopathology amongst

British Athletes abstract.....	107
3.1. Introduction.....	107
3.2. Method.....	111
3.3. Results.....	115
3.4. Discussion.....	139
3.5. Conclusion.....	150

STUDY TWO AND THREE

Section outline.....	151
----------------------	-----

Chapter 4: Eating Psychopathology amongst Athletes: The Importance of

Relationships with Parents, Coaches, and Teammates abstract.....	153
4.1. Introduction.....	153
4.2. Method.....	156
4.3. Results.....	159
4.4. Discussion.....	168
4.5. Conclusion.....	172

Chapter 5: Eating Psychopathology amongst Athletes: Links to Current

Attachment Styles abstract.....	173
5.1. Introduction.....	173
5.2. Method.....	176
5.3. Results.....	178
5.4. Discussion.....	183

5.5.	Conclusion.....	188
------	-----------------	-----

Chapter 6: Interpersonal Difficulties and Eating Psychopathology:

Links to Situational and Dispositional Interpersonal

	Difficulties abstract	189
6.1.	Introduction.....	189
6.2.	Method.....	194
6.3.	Results.....	198
6.4.	Discussion.....	214
6.5.	Conclusion.....	224

STUDY FOUR

Section outline.....	225
----------------------	-----

Chapter 7: The Prospective Role of Interpersonal Difficulties

	In Athletes' Eating Psychopathology abstract	226
7.1.	Introduction.....	226
7.2.	Method.....	228
7.3.	Results.....	231
7.4.	Discussion.....	234
7.5.	Conclusion.....	239

STUDY FIVE

Section outline.....	240
----------------------	-----

Chapter 8: Application of the Transdiagnostic Cognitive Behavioural

Model of Eating Disorders to an Athletic Population

	Abstract.....	241
8.1.	Introduction.....	241
8.2.	Method.....	244

8.3.	Results.....	248
8.4.	Discussion.....	253
8.5.	Conclusion.....	259

GENERAL DISCUSSION

Chapter 9: General Discussion.....	260
9.1. Contribution of Results to Theory and Research.....	260
9.2. Implications for Practice.....	270
9.3. Strengths and Limitations of the Thesis.....	276
9.4. Future Directions	280
9.5. Concluding Remarks.....	284
References.....	286
Appendices.....	350

List of Tables

Table 1.1. DSM-IV's diagnostic criteria for AN.....	2
Table 1.2. DSM-IV's diagnostic criteria for BN.....	3
Table 1.3. Limitations of the DSM-IV's diagnostic criteria.....	5
Table 1.4. Risk factor typology and identification methods as outlined by Kazdin et al. (1997) and Kraemer et al. (1997).....	28
Table 1.5. Risk status of the putative risk factors as described by Jacobi, Hayward et al. (2004).....	29
Table 2.1. N for Small, Medium, and Large ES at Power = .80 for $\alpha = .01$ and .05.....	81
Table 3.1. Classification of the 64 sports into sport type and sport classification.....	114
Table 3.2. Ms and SDs of BMI and EDEQ scores of elite, developmental, recreational, and non-athletes.....	116
Table 3.3. Proportion of athletes and non-athletes reporting any engagement in key eating disordered behaviours.....	118
Table 3.4. Ms and SDs of BMI and EDEQ scores of elite, developmental, recreational, and non-athlete males.....	119
Table 3.5. Ms and SDs of BMI and EDEQ scores of elite, developmental, recreational, and non-athlete females.....	120
Table 3.6. Proportion of male and female athletes and non-athletes engaging in key eating disordered behaviours.....	121
Table 3.7. Ms and Ses of BMI and EDEQ scores of athletes competing in endurance sports.....	126
Table 3.8. Ms and Ses of BMI and EDEQ scores of athletes competing in	

ball sports.....	127
Table 3.9. Proportion of male athletes competing in endurance and ball sports engaging in key eating disordered behaviours.....	129
Table 3.10. Proportion of female athletes competing in endurance and ball sports engaging in key eating disordered behaviours.....	130
Table 3.11. Ms and Ses of BMI and EDEQ scores of athletes competing in individual sports.....	133
Table 3.12. Ms and Ses of BMI and EDEQ scores of athletes competing in team sports.....	134
Table 3.13. Proportion of male athletes competing in individual and team sports engaging in key eating disordered behaviours.....	135
Table 3.14. Proportion of female athletes competing in individual and team sports engaging in key eating disordered behaviours.....	136
Table 4.1. Ms, SDs, and Spearman Rho correlations between EDEQ, S-SQRI-Parent, S-SQRI-Coach, S-SQRI-Teammate, FMPS-PS, DAS-Self-Criticism, RSES, and SCL-Depression scores.....	160
Table 4.2. Mediated effects of self-critical perfectionism, self-esteem, and depression between parental S-SQRI and EDEQ.....	163
Table 4.3. Mediated effects of self-critical perfectionism, self esteem, and depression between coach S-SQRI and EDEQ.....	167
Table 5.1. Ms, SDs, and Spearman Rho correlations between EDEQ, ECR, FMPS-PS, DAS-Self-Criticism, RSES ,and SCL-Depression scores.....	179
Table 5.2. Mediated effects of self-critical perfectionism, self esteem, and depression between ECR and EDEQ.....	181
Table 6.1. Ms, SDs, and Correlations between EDEQ, POPS, BFNE, UCLA-Loneliness, DAS-self-criticism, RSES, and	

SCL-Depression scores for athletes and non-athletes.....	199
Table 6.2. Mediated effects of self-critical perfectionism, self-esteem and depression between POPS-Mother and EDEQ amongst non-athletes.....	203
Table 6.3. Mediated effects of self-critical perfectionism, self esteem, and depression between POPS-Father and EDEQ amongst athletes and non-athletes.....	206
Table 6.4. Mediated effects of self-critical perfectionism, self-esteem, and depression between BFNE and EDEQ amongst athletes and non-athletes.....	209
Table 6.5. Mediated effects of self-critical perfectionism, self-esteem, and depression between UCLA-Loneliness and EDEQ amongst athletes and non-athletes.....	213
Table 7.1. Changes in eating psychopathology and interpersonal difficulties scores between baseline and T2 amongst athletes.....	231
Table 7.2. Ms, SDs, and partial correlations between T1 interpersonal difficulties and T2 eating psychopathology, controlling for T1 eating psychopathology.....	232
Table 7.3. Hierarchical Multiple Regression analyses with T1 interpersonal difficulties predicting athletes' T2 eating psychopathology.....	233
Table 8.1. Standardised factor loadings from the measurement model.....	247
Table 8.2. Ms, SDs, and Spearman Rho Correlations for ECR, Parental S-SQRI, Coach S-SQRI, DAS-self-criticism, FMPS-PS, RSES, SCL-depression, and EDEQ.....	249
Table 8.3. Fit indices for multi-group analyses for sport type and competition level.....	253
Table 9.1. An outline of the findings generated in this thesis.....	261

List of Figures

Figure 1.1. A schematic representation of the transdiagnostic theory of eating disorders.....	33
Figure 1.2. The hypothesised transdiagnostic cognitive behavioural model of athletes' eating psychopathology.....	78
Figure 2.1. Model specification of the hypothesised model using the parcelled items.....	105
Figure 4.1. Self-critical perfectionism and self-esteem as mediators between parent-support and eating psychopathology.....	162
Figure 4.2. Self-critical perfectionism, self-esteem, and depression as mediators between parent-conflict and eating psychopathology.....	162
Figure 4.3. Self-critical perfectionism, self-esteem, and depression as mediators between coach-support and eating psychopathology.....	165
Figure 4.4. Self-critical perfectionism, self-esteem, and depression as mediators between coach-conflict and eating psychopathology.....	166
Figure 5.1. Self-critical perfectionism, self-esteem, and depression as mediators between athletes' avoidant attachment style and eating psychopathology.....	180
Figure 5.2. Self-critical perfectionism, self-esteem, and depression as mediators between athletes' anxious attachment style and eating psychopathology.....	182
Figure 6.1. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' mother autonomy support and eating	

psychopathology.....	202
Figure 6.2. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' mother involvement and eating psychopathology.....	202
Figure 6.3. Self -critical perfectionism and depression as mediators between athletes' father autonomy support and eating psychopathology.....	204
Figure 6.4. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' father involvement and eating psychopathology.....	205
Figure 6.5. Self-critical perfectionism and depression as mediators between athletes' social anxiety and eating psychopathology.....	208
Figure 6.6. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' social anxiety and eating psychopathology.....	210
Figure 6.7. Self-critical perfectionism, self-esteem, and depression as mediators between athletes' loneliness and eating psychopathology.....	211
Figure 6.8. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' loneliness and eating psychopathology.....	212
Figure 8.1. A structural representation of the transdiagnostic cognitive behavioural model of athletes' eating psychopathology.....	250

INTRODUCTION

1

Eating Disorders: Prevalence, Risk Factors, and Correlates

“To be a serious competitor in any demanding sport requires that health must occasionally be overlooked. There are times when the line between sickness and health become fine. The threat of sickness and injury is often overruled by the desire to excel. When I am at my fittest, I am at my most vulnerable”. (Brendan Brazier, triathlete)

The benefits of engaging in organised sports are undeniable. In particular, sport participation is considered to build character, instil favourable values and beliefs, enhance self-confidence and self-esteem, as well as improve physical health (see Koivula, 1999). However, as illustrated by the quote above, sport participation is not always synonymous with psychological balance and physical health (Coelho, Soares, & Ribeiro, 2010). Specifically, a well conditioned body in sport serves as a vehicle for peak performance, and in the pursuit for athletic success, as well as a competitive edge over opponents, athletes seek to condition their body to its optimum. Fuelled by this chase for the ultimate sporting physique, some athletes participate in un-standardised practices such as restricting food, (ab)using laxatives, and excessively exercising beyond their training regime (Shanmugam, Jowett, & Meyer, 2011). Continued over a period of time, these athletes run the risk of developing a clinical eating disorder. A clinically diagnosed eating disorder can be a life-threatening illness, with fatal consequences including long-term psychological, physical, and behavioural problems, as well as fatality (Sundgot-Borgen, 1999).

1.1. What are Eating Disorders?

The Diagnostics and Statistical Manual of Mental Disorders (DSM-IV; APA, 1994) have identified several diagnosable clinical eating disorders, each characterised by severe disturbances in eating behaviour and body image. The three main disorders include Anorexia Nervosa (AN), Bulimia Nervosa (BN), and Eating Disorders Not Otherwise Specified (EDNOS).

1.1.1. Anorexia Nervosa (AN)

Derived from the Greek word ‘*Anorexia*’, meaning lack of appetite, AN is the most documented of the three clinical eating disorders but, in terms of clinical diagnosis, it is the least common prognosis out of the three (Fairburn, 2008a). The diagnostic criteria for AN as defined by DSM-IV are outlined in Table 1.1. In order to be diagnosed with AN, an individual must meet all four criteria. The diagnosis of AN can be further divided into two distinct subtypes; restrictive subtype for those who restrict and excessively exercise for weight control, and the binge eating/purging subtype for those who regularly participate in ‘binges’ and, or purgatory behaviours (i.e., self induced vomiting, laxative use).

Table 1.1. DSM-IV’s diagnostic criteria for AN

A.	Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss leading to maintenance of body weight less than 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected).
B.	Intense fear of gaining weight or becoming fat, even though underweight.
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 the current low body weight.
D.	In postmenarcheal females, amenorrhea (e.g., the absence of at least three consecutive menstrual cycles).

Specify type:

Restricting Type: during the current episode of AN, the person has not regularly engaged in binge eating or purging behaviour (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas).

Binge-Eating/Purging Type: during the current episode of AN, the person has regularly engaged in binge eating or purging behaviour (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas).

1.1.2. Bulimia Nervosa (BN)

Derived from the Greek word ‘*Boulimia*’, meaning raging hunger, it symbolises the insatiable appetite that is characteristic of the disorder. BN is a complex eating disorder, involving repeated cycles of excessive and uncontrollable consumption of food, followed by immediate attempts to eliminate the food via purgatory behaviours (Beals, 2004). The diagnostic criteria for BN as defined by DSM-IV are outlined in Table 1.2. In order to be diagnosed with BN, an individual must meet all four criteria. Similar to AN, the diagnosis of BN can be further divided into two distinct subtypes; the purgative subtype, characterised

by regular engagement in compensatory behaviours such as vomiting, laxatives, or enemas, and the non-purgative subtype, characterised by other means of compensatory behaviours such as excessive exercise, or intensely restricting food after bingeing.

Table 1.2. DSM-IV's diagnostic criteria for BN

-
- A. Recurrent episodes of binge eating. An episode of binge eating is characterised by both of the following: (1) eating; in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances, (2) a sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating).
 - B. Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise.
 - C. The binge eating and inappropriate compensatory behaviours both occur, on average, at least twice a week for 3 months.
 - D. Self-evaluation is unduly influenced by body shape and weight.
 - E. The disturbance does not occur exclusively during episodes of AN.

Specify type:

Purging Type: during the current episode of BN, the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas.

Nonpurging Type: during the current episode of BN, the person has used other inappropriate compensatory behaviours, such as fasting or excessive exercise, but has not regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas.

1.1.3. Eating Disorders Not Otherwise Specified (EDNOS).

EDNOS is viewed as a residual diagnostic eating disorder category, and is generally defined by exclusion (Palmer, 2005), that is as being any clinical eating disorder that does not fulfil the criteria for AN or BN. Specifically, this includes individuals who meet some, but not all of the aforementioned criteria for AN and BN, but display sufficient symptoms that warrant a clinical diagnosis. In many clinical presentations, EDNOS is the most common diagnosis (Fairburn, 2008a; Fairburn & Bohn, 2005). Examples of EDNOS characteristics include: women who meet all the criteria for AN, but have regular menstruation, or are of normal weight; individuals who meet all the criteria for BN, but participate in binge eating and purging behaviours less than twice a week, or have engaged in such behaviours for less than three months. This board residual category also encompasses Binge Eating Disorder (BED), marked by significant binge eating, and associated distress, but in the absence of compensatory behaviours.

1.1.4. Subclinical Eating Disorders and Disordered Eating

The terms ‘subclinical eating disorder’ and ‘disordered eating’ have been used interchangeably to describe problematic eating attitudes and behaviours, or clinical conditions that fulfil some, but not all of the aforementioned DSM-IV criteria for a clinical eating disorder (see Beals & Manore, 1994; Cotrufo, Barretta, Monteleone, & Maj, 1998). Like the three clinical eating disorders, subclinical eating disorders/disordered eating are characterised by similar disturbances in areas of eating, compensatory behaviours, and weight. Specifically, they reflect a spectrum of attitudes and behaviours including unhealthy preoccupation with body weight and shape, food restriction, dieting, binge eating, self-induced vomiting, as well as the use of laxatives and diuretics (Torstveit, Rosenvinge, & Sundgot-Borgen, 2008). There are a number of recognised subclinical eating disorders including the Female Athlete Triad, Anorexia Athletica, Exercise Dependence, Muscle Dysmorphia, and Body Dysmorphia. Although these disorders fall short of the DSM-IV diagnostic criteria for clinical significance, they are nonetheless associated with severe psychological, physical, and behavioural disturbances (Petrie & Greenleaf, 2007) and are considered to be associated with the development of clinical eating disorders (Sundgot-Borgen & Torstveit, 2010).

1.2. Limitations of the DSM-IV Classification System

The DSM-IV classification criteria are useful as they are able to provide clinical diagnosis, and each disorder can be reliably distinguished by several semi structured, or clinical interviews (Peterson & Miller, 2005). However, several concerns related to the specificity of the criteria and the categorical approach to diagnosis have been raised (e.g., Walsh, 2009; Wonderlich, Joiner Jr, Keel, Williamson, & Crosby, 2007). These are summarised in Table 1.3. Accordingly, it should be highlighted that some of these limitations (i.e., specificity of the diagnostic criteria) have been reviewed and modified accordingly for DSM-V (due for publication in 2012). The proposed changes are also documented in Table 1.3.

1.3. Prevalence and Incidence of Eating Disorders amongst the General Population

Prevalence and incidence rates are the basic measures of disease frequency (Hoek & van Hoeken, 2003). Specifically, the prevalence rate reflects the total number of cases in the population, whilst the incidence rate represents the number of new cases in the population

Table 1.3. Limitations of the DSM-IV's diagnostic criteria

Limitation 1: The specificity of the diagnostic criteria for AN, BN and EDNOS			
<i>Eating Disorder</i>	<i>Critique</i>	<i>Rationale</i>	<i>Proposed change for DSM-V</i>
AN	<p>Is the presence of 'fear of weight gain' and 'amenorrhea' necessary for clinical diagnosis?</p> <p>The phrasing of criterion A is misleading and connotes an active process that can be observed by the clinician (and others) or endorsed by the patient, as well as behaviour that is volitional, which may further contribute to the stigmatisation of AN (Becker, Eddy, & Perloe, 2009).</p>	<p>'Fear of weight gain' is not always present in the diagnosis of AN in certain cultures (e.g., Becker et al., 2009; Katzman & Lee, 1997).</p> <p>Amenorrhea is an unreliable indicator of critical weight status (e.g., Golden, & Carlson, 2008; Herzog & Delinsky, 2001).</p> <p>Many individuals fail to meet the amenorrhea criterion despite exhibiting all other criteria of AN, thereby resulting in them being categorised with EDNOS (Attia & Roberto, 2009).</p>	<p>The removal of the word 'refusal' from criterion A, and the adaptation of the wording of criterion B (fear of gaining weight) to reflect behaviours rather than cognitions, as well as making the criterion more culturally relevant.</p> <p>The presence of amenorrhea has been made redundant; allowing males, females taking exogenous hormones (e.g., oral contraceptives) and females who have not reached menarche to be diagnosed with AN.</p>
BN	<p>Is the average frequency of twice per week for three months required for clinical diagnosis?</p>	<p>Little evidence is said to exist for the validity or utility of the DSM-IV frequency criterion of twice a week binge eating (Thomas, Vartanian, & Brownell, 2009; Wilson & Sysko, 2009).</p>	<p>The reduction of the required minimum frequency of binge eating and compensatory behaviours from twice a week over the past three months, to once a week over the previous three months.</p>
EDNOS	<p>Limited information is available on this criterion by the DSM-IV, and it does not suggest any clusters of illnesses that the EDNOS criterion is based on.</p>	<p>EDNOS is intended as a residual category, however in practice EDNOS is said to capture a large proportion of patients presenting for treatment of a clinically significant eating disorder (see Fairburn & Bohn, 2005; Keel & Striegel-Moore, 2009).</p>	<p>EDNOS to be replaced by a section termed Feeding and Eating Conditions Not Elsewhere Classified. Brief descriptions of several conditions of potential clinical significance have been provided so that the problems of individuals with feeding or eating problems not meeting criteria for currently recognised disorders can be more appropriately described and categorised.</p>

Limitation 2: The validity of the eating disorder subtypes

AN	Limited empirical support for the subtypes of AN Lack of clarity of what constitutes binge eating in AN.	Initially, AN was subdivided into two categories, due to the high variance in co-morbid psychopathology and distress exhibited by the purging and restrictive subtypes (DaCosta & Halmi, 1992). However, prospective longitudinal studies have since failed to replicate such findings (Herzog et al., 1999). Rather, research has illustrated that restrictive subtypes of AN are likely to report some binge purge behaviours over the course of their disorder (Bulik, Sullivan, Fear, & Pickering, 1997). There is considerable variability in size of binge eating episodes in patients with AN, with many patients with AN eating relatively modest amounts of food when they indicate they had an eating binge, whilst others consume a lot more (Peat, Mitchell, Hoek, & Wonderlich, 2009). Thus it has been suggested that binge-purge subtype of AN could be a more severe or chronologically advanced form of AN, rather than a distinct subtype (Eddy et al., 2002).	The phrasing of the “current episode” has changed to provide a time frame of three months when specifying individuals with AN into subtypes.
BN	Limited empirical support for the subtypes of BN	Low number of studies supporting the validity and the utility of the BN- non purging subtype (see van Hoeken, Veling, Sinke, Mitchell, & Hoek, 2009). BN- non purging closely resembles BED rather than a specific subtype of BN (van Hoeken et al., 2009).	The non-purging subtype of BN is eliminated.

Limitation 3: The categorical nature of classification of eating disorders

AN/BN/EDNOS	<p>An ideal classification system should consist of categories that are mutually exclusive and collectively exhaustive. That is, its' entities should be discrete and together they should cover the ground. However, the current categorical classification of eating disorders does not, due to their overlap in content (Palmer, 2005).</p> <p>The line drawn to define an individual with an eating disorder or a disorder of clinical significance is more a matter of judgement than definitive categorisation (Palmer, 2004, 2005).</p> <p>Eating disorder classifications are unstable and patients with eating disorders often migrate from one diagnostic category to another over time (Fairburn, 2008a; Fairburn et al., 2003; Waller, 2008).</p>	<p>The categorical approach is troubled by the constant changes in criteria that are diagnostic of eating disorders (e.g., APA, 1980, 1987, 1994) due to increasing knowledge and understanding of eating disorders, and such categorisations may not be applicable across gender, culture, and age (e.g., Williamson, Gleaves, & Stewart, 2005; Wonderlich et al., 2007).</p> <p>Over a 30 month period, only a third of 192 participants retained their original eating disorder diagnosis (Milos, Spindler, Schnyder, & Fairburn, 2005).</p>
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over a specified period of time (often a year). In a review of epidemiologic studies from the United States and western Europe on young females, Hoek and van Hoeken highlighted varying prevalence rates of 0% -0.90% for AN, with an average point estimate of 0.30%, and estimates of 0%-4.5% for BN, with a average point estimate of 1%. Amongst adults, the prevalence of AN has been reported as 0.5%–0.6% in women (Garfinkel et al., 1996; Walters & Kendler, 1995) and 0.1% in men (Garfinkel et al., 1996). The prevalence of BN is slightly higher than AN, with estimates of 1.1%–2.8% amongst adult women (Bushnell, Wells, Hornblow, Oakley-Browne, & Joyce, 1990; Crowther, Armey, Luce, Dalton, & Leahey, 2008; Garfinkel et al., 1995; Kendler et al., 1991), while the prevalence of BN amongst adult men have been estimated between 0.10%-0.50% (Bushnell et al., 1990; Garfinkel et al., 1995; Kinzl, Traweger, Trefalt, Mangweth, & Biebl, 1999). More recent accounts have presented lower prevalence estimates of 0.90%-0.93% for AN, and 0.88%-1.5% for BN for adult women, and estimates of 0% -0.30% for AN, and 0.12%-0.50% for BN for adult men (Hudson, Hiripi, Pope Jr, & Kessler, 2007; Preti et al., 2009). Hoek and van Hoeken further reported in their comprehensive review that the overall incidence rate of AN is 8 per 100,000 population per year, whilst for BN the incidence rate is 12 per 100,000 population per year. In addition, they concluded that incidence rates of AN, particularly in 15–24-year-old females have increased over the past century, while increases in BN have been highlighted amongst 10–39-year-old women during the period 1988–1993: from 14.6 in 1988 to 51.7 in 1993 (Turnbull, Ward, Treasure, Jick, & Derby, 1996). However, Currin, Schmidt, Treasure, and Jick (2005) reported smaller incidence rates between 1994 and 2000 in the United Kingdom. Specifically, they estimated incidence rates of 4.7 and 6.6 per 100,000 per year for AN and BN, respectively. Moreover, the authors highlighted that while the incidence of AN remained relatively stable between 1994 and 2000, there was an increase in BN until 1996, but the incidence rates declined thereafter.

1.3.1. Who is at Risk in the General Population?

While it appears that eating disorders are relatively rare in the general population, two sub-groups of individuals have been historically highlighted as being at increased risk. First, eating disorders are reported to be more common among young adolescent females and women than their male counterparts (e.g., APA, 1994; Hoek & van Hoeken, 2003; Jacobi, Hayward, de Zwann, Kraemer, & Agras, 2004; Patton, Selzer, Coffey, Carlin, & Wolfe, 1999; Striegel-Moore & Bulik, 2007; Striegel-Moore et al., 2009). Specifically, Reijonen,

Pratt, Patel, and Greydanus (2003) reported that adolescent females are four times more likely to develop an eating disorder than adolescent males, while adult women are 10 times more likely to be diagnosed with eating disorders than adult men. Striegel-Moore et al. further reported that females were more likely to report body checking and avoidance, engage in fasting, and self-induced vomiting than males. However, females are less likely than their male counterparts to report binge eating and the use of excessive exercise for weight control (e.g., Anderson & Bulik, 2004; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002).

Second, eating disorders have been observed to affect Caucasian females more than other ethnic groups (Striegel-Moore & Smolak, 1996). However, recent studies have revealed a more complex pattern of relationship, and now indicate that eating disorders occur across ethnic groups (e.g., Franko, Becker, Thomas, & Herzog, 2007; Gilbert, 2003; Jacobi, Hayward et al., 2004). Specifically, Crago, Shisslak, and Estes (1996) reported that Hispanics reported similar rates of eating disturbances as Caucasians, while Native Americans reported higher rates than Caucasians, and Black and Asians reported lower rates than Caucasians. In addition, Striegel-Moore et al. (2000) demonstrated that while Blacks report lower rates of eating disorder symptoms than Caucasians, they exhibit equal if not higher rates of binge eating behaviours than Caucasians. Similarly, Franko et al. found that the frequency of binge-eating, restrictive eating, and self-induced vomiting did not differ significantly across Caucasians, African American, Latino, Asian, and Native Americans. However, significant differences were found with respect to modes of purging. In particular, Asian American participants were less likely to report diuretic use compared to the other four groups, and Native Americans more frequently reported laxative use, and multiple methods of purging relative to the other four groups.

1.4. Prevalence of Eating Disorders amongst Athletes

Since the 1980s there has been increasing attention paid to the relationship between athletic participation and eating problems. Specifically, interest in this area was aroused through case studies, anecdotal reports, and press accounts (Byrne & McLean, 2001). This was then further heightened by the death of Christy Henrich, an elite US gymnast who publicly suffered from an eating disorder for several years, as well as the now infamous book by Joan Ryan (1995) entitled 'Little Girls in Pretty Boxes: The Making and Breaking of Elite Gymnasts and Figure Skaters', which depicted the real life stories of gymnasts and figure skaters training for Olympic glory. Ryan illustrated that carefully concealed behind the sport-constructed public image of these athletes, was a troubled reality composed of eating

disorders and extreme dieting, resulting in weakened bones, stunted growth, and debilitating injuries. However, in reality there is inconsistent and inconclusive empirical evidence as to how athletic participation may be related to eating disorders. In particular, while some authors argue that mere participation in sport enhances the susceptibility of developing an eating disorder (e.g., Sundgot- Borgen, 1994; Sundgot-Borgen & Larsen, 1993), others maintain that athletic participation provides a protective barrier against such development (e.g., Coelho et al., 2010; Rosendahl, Bormann, Aschenbrenner, Aschenbrenner, & Strauss, 2009; Vig & Rosenberg, 1993; Zucker, Womble, Williamson, & Perrin, 1999). As a result of these conflicting findings, a recent review of the literature concluded that there is little empirical evidence to demonstrate that engagement in sport places athletes at increased risk of developing eating disorders, given that there were no significant differences regarding the presence of problematic eating between athletes and non-athletes in 55% of the studies examined (Coelho et al., 2010).

Nonetheless, in recent years, a higher prevalence of eating disorders has been frequently reported amongst athletes than the general population (e.g., Hausenblas & Carron, 1999; Smolak, Murnen, & Ruble, 2000; Sundgot-Borgen & Torstveit, 2004). Specifically, Smolak et al. in their meta- analysis, revealed that the prevalence of eating disorders is higher amongst female athletes competing at the elite and collegiate level than their respective non-athletic female counterparts, with a significant (albeit small) effect size of 0.07 and 0.15 respectively. Similarly, Hausenblas and Carron, from their meta-analysis, concluded that there were significant differences between female athletes, male athletes and their respective non-athletic counterparts on their tendency to self-report indices associated with AN and BN. In particular, they reported a small effect size of 0.12 and 0.16 between female athletes and female non-athletes on AN, and BN symptomatology, respectively. Correspondingly, a moderate effect size of 0.30 and 0.35 was found between male athletes and their non-athletic counterparts on AN, and BN symptomatology, respectively. Although the difference between male athletes and male non-athletes was found to be greater than the difference between female athletes and female non-athletes, Hausenblas and Carron reported that the actual cases of eating disorders amongst the male population as a whole was relatively low compared to the female population.

Although the aforementioned results were marked by substantial heterogeneity, these findings collectively suggest that the prevalence of eating disorders or eating disordered

symptoms is higher amongst the athletic population than the non-athletic population. Accordingly, many reasons can be put forward, as to why the prevalence may be higher amongst the athletic population. First, athletes are subjected to increased sociocultural pressure to conform to an ideal body shape (Byrne & McLean, 2001). Specifically, Byrne and McLean argued that in addition to the general societal pressure to maintain a thin body ideal, athletes also face pressure from within their sport to improve their physique or maintain a lean body for peak performance. Furthermore, it is a commonly held misconception within the sporting environment that low body weight, or low body fat equates to performance increments (Beals, 2004). As such, athletes competing in sports where a low body weight is emphasised may be under more intense pressure to maintain a thin physique. Secondly, athletes' susceptibility to eating disorders may be further enhanced by the psychological traits that they need to succeed in competitive sport. Specifically, successful athletes are often described as perfectionistic, goal-orientated, competitive, and overtly concerned with performance and body shape (e.g., Brownell, Rodin, & Wilmore, 1992; Byrne & McLean, 2001; Thompson & Sherman, 1999a), yet, these qualities are also common amongst patients with eating disorders (e.g., Jacobi, Hayward et al., 2004). Accordingly, while these personal characteristics may be advantageous for performance success, they may also place athletes at increased risk for eating disorders (e.g., Hausenblas & Carron, 1999; Sanborn, Horea, Siemers, & Dieringer, 2000; Thompson & Sherman, 1999a).

Next, the onset of an eating disorder is likely to occur during adolescence and early adulthood (e.g., Striegel-Moore & Bulik, 2007), which, coincidentally, is the age range at which most elite athletic participation and competition is said to occur (e.g., Wylleman & Lavalley, 2004). Thus, the onset of puberty and associated bodily changes may place athletes, and in particular female athletes, at heightened risk for the development of eating disorders (Byrne & McLean, 2001). Finally, excessive exercise has been integrally linked to the development of eating disorders (e.g., Davis, Kennedy, Ravelski, & Dionne, 1994; Lipsey, Barton, Hulley, & Hill, 2006). As such, strenuous exercise may reduce the value of food reinforcement which subsequently causes decreased food intake (Epling & Pierce, 1988). Consequently, a reciprocal relationship is said to develop, whereby the motivational value of exercise increases and appetite decreases, resulting in weight loss. Therefore, the high activity levels often demanded of athletes might place them at increased risk of eating disorders (Hausenblas & Carron, 1999).

Given these factors for heightened risk, as well as the evidence for increased eating disordered symptomatology amongst athletes compared to the general population, the identification of the prevalence of eating disorders among the athletic population is of paramount importance. Alarming, a closer inspection of the literature shows that the prevalence rates available on eating disorders amongst athletes is often contradictory and poorly established, with widely ranging rates of 0%-89% (e.g., Johnson, Powers, & Dick, 1999; Quah, Poh, Ng, & Ismail, 2009). While the large variation in the prevalence rates can be accounted for by extensive methodological shortcomings, which are described further in section 1.5 of this chapter, they also appear to be dependent on the population under study. For example, studies examining the prevalence of eating disorders amongst the elite athletic population within western Europe have reported rates of 9.3% -22.5% (Sundgot-Borgen, 1993; Sundgot-Borgen & Torstveit, 2004; Toro et al., 2005), while the prevalence rate of eating disorders among American collegiate athletes range from 0% to 3.4% (e.g., Johnson et al., 1999; Sanford-Martens et al., 2005). Specifically, Sundgot-Borgen reported that 9.3% of elite Norwegian female athletes met the criteria for clinical eating disorders. In particular, 1.3% and 8% of the athletes were diagnosed with AN, and BN respectively, as outlined by the DSM-III-R. Correspondingly, in their study using elite Spanish female athletes, Toro et al. reported that 22.5% of the female athletes met the criteria for clinical eating disorders, of which 2.5% were classified with AN, and 20% were classified with BN.

In a large scale study of the National Collegiate Athletic Association (NCAA), Johnson et al. (1999) found that no female or male athletes met the DSM-IV criteria for AN, but 1.1% and 0% of female and male athletes met the criteria for BN, respectively. Johnson et al. further reported that 2.85% and 9.2% of female athletes displayed AN, and BN symptoms that were of a significant level respectively, but did not meet the DSM-IV diagnosis criteria. Correspondingly, Sanford-Martens et al. noted similar trends amongst their collegiate athletic sample. Specifically, they noted that while 3.4% of athletes were diagnosed with clinical eating disorders, a further 18% of athletes were found to display symptoms of clinical significance, but not to diagnosable levels. Thus, indicating that clinical eating disorders may be more prevalent in elite athletes, while subclinical eating disorders and related conditions may more ubiquitous among collegiate athletes.

1.5. Methodological Issues

Two main methodological issues have been put forward to account for the wide range in prevalence rates: (a) classification and measurement and (b) methodology and sample selection (see Petrie & Greenleaf, 2007).

1.5.1. Classification and Measurement Problems

Classification issues reflect the varying diagnostic criteria employed to determine cases of eating disorders. As previously mentioned, clinical cases of eating disorders (e.g., AN, BN, & EDNOS) are classified and diagnosed according to the DSM-IV. However, only a handful of studies have employed these rigorous and strict criteria (e.g., Johnson et al., 1999; Sundgot-Borgen, 1993, 1994). A large number of studies have on the other hand loosened the diagnostic criteria and employed their own criteria, as reflected by mean scores on eating disorder questionnaires (e.g., Augestad, Saether, & Gøettestam, 1999; Nordin, Harris, & Cumming, 2003; Vig & Rosenberg, 1993), or on self-developed questionnaires (e.g., Black & Burkes-Miller, 1988; Rosen & Hough, 1988). Consequently, these studies conceptually measured cases of disordered eating rather than eating disorders. Measurement issues reflect the use of different eating disorder questionnaires to assess the presence of eating disorder symptoms. Specifically, a large number of studies have placed an over reliance on varying self-report measures to detect potential cases of eating disorders. While some authors have employed self-developed questionnaires which lack validation, others have employed a wide range of validated measures such as the Eating Disorder Inventory (EDI: Garner, Olmstead, & Polivy, 1983), the Eating Attitudes Test (Garner, Olmsted, Bohr, & Garfinkel, 1982), and the Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, & Schneider, 1997) to capture the attitudes and behaviours delineating eating disorders (e.g., Greenleaf, Petrie, Carter, & Reel, 2009; Martinsen, Bratland-Sanda, Eriksson, & Sundgot-Borgen, 2010; Petrie, Greenleaf, Carter, & Reel, 2008; Sanford-Martens et al., 2005). Consequently, studies that have employed the less strict classification criteria, and self-developed questionnaires, as opposed to the pre-existing validated eating disorder questionnaires and the DSM-IV criteria, report higher prevalence rates.

1.5.2. Methodology and Sample Selection

Methodology issues refer to the variety of methods employed to detect cases of eating disorders. To diagnose cases of eating disorders within a given population, a two-stage

procedure is advocated, whereby individuals are initially screened employing a validated self-report measure, and then those identified as at 'high risk' are clinically interviewed (e.g., le Grange, Tibbs, & Noakes, 1994; Sundgot-Borgen, 1993). However, as previously mentioned, a large number of studies have employed self-report measures, albeit validated questionnaires, to detect potential cases of eating disorders (e.g., Greenleaf et al., 2009; Martinsen et al., 2010; Petrie et al., 2008). However, the sole reliance on these self-report measures is unlikely to be accurate, as eating disorders are considered to be poorly assessed by self-report measures alone (Fairburn & Beglin, 1990). Furthermore, the frequently employed measures (e.g., EDI, EAT) have yet to be validated for use for diagnosing eating disorders in both the athletic and the general population, and are considered to only capture the presence of 'disturbed eating patterns' rather than clinical cases of eating disorders (Garner, 1991).

Finally, sample selection issues reflect the diversity in sample size and the characteristics of the sample employed within prevalence literature. A large number of studies have employed relatively small sample sizes (e.g., Ferrand & Brunet, 2004; Okano et al., 2005), utilised varying definitions of the term 'athlete' (e.g., Rosendahl et al., 2009; Stoutjesdyk & Jevne, 1993; Sundgot-Borgen, 1994), focused primarily on the experiences of females athletes (e.g., Beals & Manore, 2002; Reinking & Alexander, 2005; Sundgot-Borgen, 1993), employed a narrow focus on high risk sports (e.g., de Bruin, Oudejans, & Bakker, 2007; Hulley, Currie, Njenga, & Hill, 2007) and failed to employ a group of non-athletic controls (e.g., Greenleaf et al., 2009; Petrie et al., 2008). Consequently, studies possessing such sampling issues report higher prevalence rates than those studies that do not contain such sampling restrictions.

1.6. Recommended Guidelines for Prevalence Studies

Guidelines have now been recommended in an attempt to overcome the current methodological limitations in prevalence studies amongst athletes (see Petrie & Greenleaf, 2007). Although a two-stage procedure of screening and diagnosis is perceived as the 'gold standard' method for prevalence studies, Petrie and Greenleaf have proposed that a psychometrically sound questionnaire be employed in instances where this procedure is not possible. In particular, questionnaires that have been standardised and validated with the current diagnostic criteria have been encouraged for use. Next, both Petrie and Greenleaf and

Hausenblas and Carron (2002) recommend that researchers should ideally employ a large sample drawn from single high risk sports however, when drawing a large single sport sample is not practical, it has been advised to use an already established classification system. Finally, Petrie and Greenleaf recommended that a large representative sample composed of male athletes, and a control group of non-athletes are employed in future prevalence studies.

1.7. Gold Standard Study

Only one study has built beyond the limitations outlined in section 1.5, by (a) following the advocated stringent two-stage procedure of assessment and diagnosis, (b) using both male and female athletes, and (c) using a control group of non-athlete males and females (Sundgot-Borgen & Torstveit, 2004). The first stage of this study involved screening athletes using the EDI (Garner et al., 1983) and the second stage involved a clinical interview following the format of the Eating Disorder Examination (EDE; Cooper, Cooper, & Fairburn, 1989). Following screening, 121 female and 61 male athletes (out of 572 females and 687 male athletes) and 81 female and 22 male controls (out of 574 female and 629 males) were classified as being at ‘high risk’ of developing an eating disorder. Subsequently, a sample of ‘high risk’ and ‘low risk’ athletes and controls were clinically assessed. Results revealed that 13.5% of elite Norwegian athletes were classified with a clinical or subclinical eating disorder, while 4.6% of the non-athlete controls were diagnosed with a clinical or subclinical eating disorder. Of the athletes classified as eating disordered, 0.9% was diagnosed with AN, 4.2% with BN, and 6% with EDNOS. A further 2.4% of athletes were diagnosed with Anorexia Athletica.

1.8. Who is at Risk in the Athletic Population?

1.8.1. Gender

Similar to the general population, it is generally accepted that female athletes are more likely to develop an eating disorder or exhibit eating disorder symptomatology than male athletes (e.g., Baum, 2006; Dosil & Casais, 2008; Hopkinson & Lock, 2004; Martinsen et al., 2010; Rouveix, Bouget, Pannafieux, Champely, & Filaire, 2007). In particular, studies have found prevalence rates of 0%-89% amongst female athletes (e.g., Greenleaf et al., 2009; Johnson et al., 1999; Pernick et al., 2006; Quah et al., 2009) compared to the 0%-21.2% in male athletes (e.g., Johnson et al., 1999; Petrie et al., 2008; Sanford-Martens et al., 2005).

Moreover, in a recent study, Martinsen et al. (2010) revealed that female athletes were five times more likely to report symptoms of eating disorders than their male counterparts (OR= 5.310, 95% CI = 3.491-8.078). However, this pattern of relationship is often biased by the lack of empirical data available on male athletes and problematic eating, as well as the lack of male athlete samples in studies to make comparative deductions. Nonetheless, of the few studies that have directly compared male and female athletes in a single study, there is compelling evidence indicating that female athletes are at heightened risk of developing eating disorders compared to their male counterparts (e.g., Hausenblas & McNally, 2004; Hopkins & Lock, 2004; Johnson et al., 1999). For example, Sundgot-Borgen and Torstveit (2004) found a higher prevalence of eating disorders amongst elite female athletes than male athletes, with 20% of elite females classified with clinical and subclinical eating disorders, compared to 8% of elite male athletes. Similarly, at the collegiate level, Johnson et al. (1999) reported that female athletes are 9 times as likely to display BN symptoms, and twice as likely to report AN symptomatology, than male athletes.

Conversely, there is increasing research indicating that male athletes may be more at risk of developing subclinical eating disorders, or displaying symptoms of eating disorders that do not quite meet the DSM-IV diagnostic criteria (e.g., Dale & Landers, 1999; Sanford-Martens et al., 2005; Thiel, Gottfried, & Hesse, 1993). Specifically, Sanford-Martens et al. reported that while a higher number of female athletes were diagnosed with clinical eating disorders, a higher percentage of male athletes (21.2%) were classified as displaying signs and symptoms that were symptomatic of eating disorders than female athletes (14.5%). Furthermore, there is evidence to suggest that male athletes are more likely to engage in compensatory weight control behaviours such as excessive exercise, self-induced vomiting, using diuretics and laxatives (e.g., Greenleaf et al., 2009; Petrie et al., 2008). For example, Petrie et al. reported that 37% of male athletes excessively exercised, 6.5% engaged in self-induced vomiting, 4.5% and 7.9% reported using diuretics and laxatives respectively as methods to control their weight, while Greenleaf et al. found that 25.5% of female athletes excessively exercised, 2.9% engaged in self-induced vomiting, 1.5% and 1% reported using diuretics and laxatives respectively as methods to control their weight.

Taken together, the preceding findings suggest that eating concerns are not confined to female athletes, although it appears that female athletes are at increased risk of developing a clinical eating disorder. However, it is also apparent that male athletes are more likely to

display subclinical levels of eating disorders, and engage in purging methods such as excessive exercise, self-induced vomiting and laxative and diuretics to control their weight than females.

1.8.2. Sport type

Brownell et al. (1992) proposed that “the greater extent to which an athlete’s body deviates from the ‘ideal’ for a particular sport, then the greater the risk that the athlete will develop an eating disorder” (pp.122). Consequently, the type of sport that athletes participate in also appears to determine the prevalence rates of eating disorders. Athletes that participate in sports which emphasises leanness, sports which focus on aestheticism and sports that have a weight requirement have been highlighted as at increased risk. In particular gymnasts, figure skaters, divers, distance runners, and wrestlers are said to face increased pressure to maintain a low body weight to impress judges, improve performances, or to qualify to compete in specific weight categories (Petrie & Greenleaf, 2007). Research looking into sport type can be primarily categorised into three groups; research that considers sports that emphasise leanness and non-leanness (e.g., Crissey & Crissey- Honea, 2006; Rosendahl et al., 2009; Zucker et al., 1999), research that uses a specific classification system (e.g., Sundgot-Borgen, 1993, 1994; Sundgot-Borgen & Larsen, 1993; Sundgot-Borgen & Torstveit, 2004) and research that examines single sports identified as ‘at risk’ of high levels of eating disorder (e.g., de Bruin et al., 2007; Hulley et al., 2007; Monsma & Malina, 2004; Petrie, 1993; Taylor & Ste- Marie, 2001). The following section will provide a brief overview of these groups of research.

1.8.2.1. Leanness v non leanness.

Athletes competing in leanness emphasised sports (e.g., the maintenance of low body fat, low body weight, and appearance is central to performance) against non-leanness sports, are generally considered more at risk of developing an eating disorder than those who participate in sports where there is no requirement to be lean (e.g., Petrie, 1996; Torstveit et al., 2008). For example, Petrie examined the difference between male and female athletes competing in leanness and non-leanness sports. Amongst female athletes, Petrie reported that those competing in leanness sports expressed greater preoccupation and concern about their weight and dieting than non-leanness athletes, but both groups expressed similar levels of body dissatisfaction. Relative to male athletes competing in leanness and non-leanness

sports, Petrie found no significant differences in eating disordered attitudes and behaviours. Similarly, both Martinsen et al. (2010) and Rosendahl et al. (2009) also reported that the frequency of eating disorders was higher in athletes competing in leanness sports than athletes competing in non-leanness sports. Specifically, Martinsen et al. reported that a higher number of eating disorders were found amongst female athletes engaged in lean sports than in female athletes engaged in non-leanness sports, while Rosendahl et al. found that male athletes competing in leanness sports were twice as likely to report eating disordered attitudes and behaviours as male athletes competing in non-leanness sports. Further consolidating these findings, Hagmar, Hirschberg, Berglund, and Berglund (2008) found that Olympic level athletes participating in sports where leanness is emphasised exhibit a lower Body Mass Index (BMI), more pronounced variations in weight, more frequent attempts to lose weight, as well as longer and higher intensity training load than athletes for whom leanness was less important. Hagmar et al. further added that although none of the athletes reported an ongoing eating disorder, 9.4% of athletes competing in sports which emphasised leanness reported a previous history of eating disorders, compared to 2.7% of athletes competing in non-leanness sports.

1.8.2.2. Sport classification system.

Sundgot-Borgen and colleagues (e.g., Sundgot-Borgen, 1993, 1994; Sundgot-Borgen & Larsen, 1993; Sundgot-Borgen & Torstveit, 2004) and others (e.g., Greenleaf et al., 2009; Hausenblas & Carron, 1999; Petrie et al., 2008) have employed a more sophisticated classification system when examining sport type differences in eating disordered symptoms. Specifically, sports have been categorised into six distinct groups: aesthetic (sports where the important aspect is the subjective evaluation by judges of competitive performances), endurance (sports where main training was aerobic endurance training), ball games (all ball sports), power (sports where main component is strength training), weight dependent (sports in which specific weights are required to compete) and technical (all technical sports that did not specifically fit into any of the other categories). Employing this system, Sundgot-Borgen (1993) reported that eating disorders were significantly more prevalent amongst female athletes competing in aesthetic (34%), and weight dependent sports (27%), than female athletes competing in endurance sports (20%), technical sports (13%), and ball sports (11%). She further reported that engagement in compensatory weight control methods were also higher amongst female athletes competing in aesthetic sports (34%), weight dependent sports

(32%) and endurance sports (20%) than female athletes competing in the other three sport groups.

Building upon these findings, Sundgot- Borgen and Torstveit (2004) further expanded this classification system to include two more categories: antigravitation and motor sports. They reported that a higher percentage of female athletes competing in aesthetic (42%), weight class (30%), and endurance sports (24%) were classified with eating disorders, than those competing in technical sports (17%), and ball sports (16%). Only one female athlete competing in power sports and antigravitation sports were classified with eating disorders. Additionally, a higher percentage of male athletes participating in antigravitation sports (22%) and weight class sports (18%) were classified as eating disordered, than those competing in endurance sports (9%), ball games (5%) and technical sports (4%). No male athletes competing in aesthetic sports were classified with an eating disorder in this study, whilst only one male athlete competing in power sports was classified with an eating disorder.

1.8.2.3. Single sports.

Hausenblas and Carron (2002) suggested that due to problems associated with combining sports into broad categories, research examining sport type differences should focus on single sports. As such, research examining the prevalence of eating disorders amongst single sports have primarily focused on sports such as gymnastics (e.g., de Bruin et al., 2007; Nordin et al., 2003; Petrie, 1993), figure skating (e.g., Monsma & Malina, 2004; Taylor & Ste-Marie, 2001; Ziegler et al., 1998), wrestling (e.g., Dale & Landers, 1999; Enns, Drewnowski, & Grinker, 1987; Oppliger, Landry, Foster, & Lambrecht, 1993) and distance running (e.g., Hulley et al., 2007; Hulley & Hill, 2001; Okano et al., 2005). Subsequently, the prevalence of eating disorders is relatively high amongst these sports. Specifically, studies have found the prevalence of eating disorders amongst gymnasts to range between 14%-61.3% (e.g., Ferrand, Champely, & Filaire, 2009; Nordin et al. 2003; Petrie, 1993). Similarly, high prevalence rates of 54% have been noted in female figure skaters (Monsoma & Malina, 2004). Moreover, Taylor and Ste-Marie (2001) noted that their sample of figure skaters displayed similar profiles to that of a clinical sample of AN-restrictive subtype. In particular, figure skaters scored higher than the clinical sample of AN-restrictive subtype on the Bulimia subscale of the EDI, but scored relatively similar on Body Dissatisfaction, and

Drive for Thinness subscales. Slightly lower prevalence rates, on the other hand, have been reported amongst distance runners and wrestlers (compared to gymnasts and figure skaters). Specifically, the prevalence rates range between 4% -21% amongst distance runners (e.g., Hulley & Hill, 2001; Hulley et al., 2007; Okano et al., 2005; Weight & Noakes, 1987), and between 1.7%-31% amongst wrestlers (e.g., Dale & Landers, 1999; Oppliger et al., 1993; Thiel et al., 1993).

1.8.2.4. Individual v team sports.

There is one sport type area that remains relatively unexplored within the context of eating disorders amongst athletes: individual versus team sports. Pressure from teammates has been linked to eating disorders both anecdotally and empirically (e.g., Hausenblas & Carron, 2000; Thompson & Sherman, 1999b). Specifically, Thompson and Sherman reported that there is often a contagion effect within athletic teams, with unhealthy eating behaviours spreading from one person to the other. This can take place in two ways: teammates talking directly to each other about the methods that they are actively employing to lose weight or an athlete may notice that a successful athlete is employing rigid diets, pathogenic weight control methods and thus engage in similar behaviours to be as successful. Moreover, several studies have documented that engagement in team sports may contribute to the development of problematic eating, with teammates said to influence disordered eating through social pressure (Williamson et al., 1995), encouragement to engage in unhealthy weight control methods such as laxatives, diet pills, or self-induced vomiting (Rosen, McKeag, Hough, & Curley, 1986), as well as by promoting competition between teammates to lose weight (Chopak & Taylor-Nicholson, 1991). Based on these findings, it then seems plausible that peer influence and team culture may play a role in encouraging an athlete to engage in unhealthy eating practices. However, Hausenblas and Carron, reported that the influence of teammates can also be positive and constructive, that the presence of teammates can encourage athletes to eat healthily, and discourage participation in any unhealthy eating behaviours. In addition, there is anecdotal evidence suggesting the prevalence of eating disorders is higher amongst athletes involved in individual sports than athletes involved in team sports, due to the aesthetic, and judgment component associated with performance evaluation (e.g., gymnastics, figure skating). In the only empirical study to assess such difference, Haase (2009) found that female athletes competing in individual sports reported more dieting, and BN attitudes and behaviours than female athletes involved in team sports.

From these aforementioned studies, it is clear that certain sport disciplines may contain characteristics that make them high risk sports. However, it is important to note that a handful of studies have failed to detect any differences between athletes competing in leanness sports and non-leanness sports (e.g., Beals & Hill, 2006; Ferrand, Magnan, & Philippe, 2005; Nichols, Rauh, Barrack, Barkai, & Pernick, 2007; Quah et al., 2009). Rather, these studies have reported that although athletes in leanness emphasised sports were characterised by greater negative feelings about their appearance, they did not display greater problematic eating behaviours. Similarly, two studies employing the sport classification system as outlined by Sundgot-Borgen and colleagues (e.g., Sundgot-Borgen, 1993, 1994; Sundgot-Borgen & Larsen, 1993) have failed to detect such sport type differences (e.g., Greenleaf et al., 2009; Petrie et al., 2008). There are also some notable variations in how certain sports were classified in studies. For example, while one study categorised volleyball as a refereed/non-leanness sport (Zucker et al., 1999), another study classified it as a sport emphasising leanness (Crissey & Crissey-Honea, 2006). Similarly, in studies employing the sport classifications system, swimming has been used as both a weight dependent sport (e.g., Petrie, 1996) as well as an endurance sport (e.g., Sundgot-Borgen, 1993; Sundgot-Borgen & Torstveit, 2004). In relation to the single sport studies, it should be noted that a large number of these studies have employed sample sizes of less than 200, which inflate the prevalence estimates. Moreover, the majority of these studies have focused primarily on female athletes; therefore it is unclear whether it is the characteristics of the sport that makes them high risk sport, or whether it is the gender of the athlete. Additionally, many of these studies have primarily focused on one particular performance standard (e.g., elite) and it is unclear whether these trend is evident in less competitive athletes. Therefore, taken together, there is evidence to suggest that the type of sport an athlete competes in may place them at higher risk of developing eating disorders, however given the lack of consistency in the classification system employed to examine such differences, the current relationship between sport type and eating disorders should be treated cautiously.

1.8.3. Competitive Level

The literature examining the impact of competitive level on the prevalence of eating disorders is somewhat less clear, as well as limited in quantity in comparison to the data available on gender and sport type. While it has been proposed that as the competitive level increases, the risk of athletes developing eating disorders also increases (e.g., Sundgot-

Borgen 1994), however, the evidence supporting this notion is not so clear cut. As previously mentioned, a large number of studies have demonstrated that competitive level athletes are at elevated risk for developing an eating disorder when compared to non-athletes (e.g., Smolak et al., 2000; Sundgot-Borgen & Torstveit, 2004), however it is not explicit whether elite athletes are at more risk than their less competitive counterparts, as the majority of the studies have focused on one competitive level: elite or collegiate.

There is some evidence to suggest that higher competitive level athletes report more eating pathologies than lower competitive level athletes (e.g., Picard, 1999; Pritchard, Rush, & Milligan, 2007; Rosendahl et al., 2009; Stoutjesdyk & Jevne, 1993). However, there is also comparable evidence to suggest that the less competitive level athletes report more eating pathologies than their more competitive counterparts (e.g., Harris & Greco, 1990; Hausenblas & Carron, 1999), or that there is no significant difference in the eating attitudes of athletes competing in sports at various performance levels (e.g., Ferrand & Brunet, 2004; Hausenblas & McNally, 2004; Holm-Denoma, Scaringi, Gordon, Van Orden, & Joiner Jr, 2009). For example, Picard reported that NCAA Division I athletes displayed greater eating disorder characteristics such as greater drive for thinness, greater preoccupation with weight, and diets than NCAA Division III athletes. Similarly, Pritchard et al. in their comparison of collegiate athletes, and high school athletes, reported a higher prevalence of eating disorders amongst collegiate athletes (28.2%) than high school athletes (8.4%). The authors noted that collegiate athletes also reported more dissatisfaction with their bodies, than high school athletes. Furthermore, Smolak et al. (2000) found that while elite female athletes reported greater eating disorder symptoms than female non-athletes, female athletes competing at the non-elite level (e.g., high school) reported fewer eating disorder symptoms than female non-athletes, placing them at lower risk of developing an eating disorder than non-athletes and elite athletes.

From their meta-analysis, Hausenblas and Carron (1999) reported that eating disorder symptoms may be more common amongst less competitive level athletes. Specifically, they noted that compared to female club level athletes, the prevalence of BN symptoms were higher in female high school athletes, whilst male varsity level athletes reported greater drive for thinness than male club level athletes. Moreover, they concluded that male varsity and club athletes were more likely to report greater BN symptomatology than male non-athletes. Further contradicting Smolak et al.'s (2000) suggestion that sport participation at the non-

elite levels protect athletes from unhealthy eating behaviours, Levitt (2008) reported that females involved in recreational sports may face a greater risk of developing eating disorders than their female counterparts participating in competitive organised sports, or in no sport. In the case of males, she reported that competing at the club level poses greater risk than competing at the intramural, intercollegiate, recreational level, and in no sport.

It seems logical and plausible to assume that as competitive level increases, athletes' susceptibility to an eating disorder also heightens. However, it is difficult to formulate a conclusion as to which subgroup of athletes are at increased risk, as the majority of these studies have narrowly focused on one performance level (e.g., elite, collegiate, or high school) rather than on multiple performance levels. Of the studies that have focused on eating disorder symptoms across various performance levels concurrently, they suggest that eating disorders may be somewhat more prevalent in athletes competing at the developmental stage (e.g., collegiate, club, and regional athletes) than at the elite or the non-elite/recreational level (e.g., Hausenblas & Carron, 1999; Hausenblas & McNally, 2004; Levitt, 2008; Pritchard et al., 2007).

The preceding section discussed the prevalence of eating disorders in the athletic population. In contrast to the general population, the prevalence of eating disorders amongst the athletic population appears to be relatively high. Consequently, identifying the mechanisms and processes involved in the aetiology of eating disorders is also of paramount importance. Accordingly, the following sections review the literature on the possible risk factors and correlates for eating disorders in both the general and athletic population.

1.9. Risk factors and Correlates of Eating Disorders in the Athletic Population

Eating disorders are complex disorders associated with extensive physical and psychological comorbidity, as well as impaired functioning (e.g., Klump, Bulik, Kaye, Treasure, & Tyson, 2009; Lewinsohn, Striegel-Moore, & Seeley, 2000). However, the most frequently investigated risk factor within the athletic population is the mere influence of sport participation on eating disorders. Specifically, research has examined whether participating in particular sports, at a particular performance level are predictive of eating disorders amongst athletes (see section 1.8 of this Chapter for further details). However, Jacobi, Hayward et al. (2004) in their comprehensive meta-analysis concluded that sport participation is a correlate of eating disorders, due to the lack of prospective studies available to illustrate

the precedence of sport participation on the onset of eating disorders. Beyond this, research examining the specific mechanisms involved in eating disorders of athletes is sparse and still very much in its infancy (Petrie & Greenleaf, 2007). Moreover, of the studies that have examined potential risk factors, these studies have primarily examined and focused on contextualised and sport-related pressures and their association to eating disorders. These studies will now be briefly evaluated.

Sundgot-Borgen (1994) questioned 103 'at risk' (of eating disorders) female athletes about their reasons for the development of their eating disorder. Sundgot-Borgen reported that 15% of athletes classified with an eating disorder did not know the reason for their eating disorder. However, of those that responded, 48% of the athletes attributed it to traumatic events (e.g., illness or injury to the individual or a family member, a new coach, familial and relationship problems, death of a significant other, sexual abuse), 41% attributed it to prolonged periods of dieting or weight fluctuations, and 11% attributed it to significant increase in training volume. Moreover, Sundgot-Borgen reported that a significant number of athletes began dieting to lose weight on the recommendations of their coach, of which only 10% were provided with guidance on how to lose weight.

Correspondingly, external social pressures from coaches and trainers have also been linked as a potential risk factor for eating disorders amongst athletes (e.g., Heffner, Ogles, Gold, Marsden, & Johnson, 2003; Kerr, Berman, & De Souza, 2006; Muscat & Long, 2008; Rosen & Hough, 1988). For example, Heffner et al. reported that 44% of coaches engaged in some form of weight management and monitoring, whilst 30% and 29% of coaches encouraged weight loss through restricting food intake and extra workouts respectively. Likewise, Rosen and Hough noted that athletes that are encouraged to diet by their coaches were more likely to resort to faster and unhealthy methods to lose weight such as self-induced vomiting, diet pills, or fasting. Specifically, they concluded that comments about highly sensitive issues such as weight from someone important in athletes' life, someone whom the athletes wish to please, can exert a devastating effect on the athlete, which can easily initiate an eating disorder. Accordingly, Muscat and Long reported that 58% of athletes and sport participants reported having received critical comments made about their body shape or weight, their need to diet or lose weight or to increase their food intake to gain weight. In particular, the results revealed that the greater the athletic involvement, the greater the frequency of recalled critical comments and that those who received critical comments reported greater levels of eating disordered symptoms. However, interestingly, 42% of the

critical comments received were from family members, 33% were from friends and 25% were from coaches. Further corroborating these findings, Jacobi et al. (2011) found critical comments from coaches (and teachers) as the best predictor of eating disorder symptomatology, with 39% of the participants that experienced critical comments, classified with sub-threshold eating disorders.

In addition to social pressures to maintain a low body weight and shape, studies have also identified team uniforms and attire as possible causes of eating disorders (e.g., Greenleaf, 2002; Reel, Soohoo, Petrie, Greenleaf, & Carter, 2010; Smiley, Aberdeen, & Lim, 2008). Specifically, Greenleaf (2004) reported that synchronized skating uniforms such as tight fitting skating dresses which reveal much of the skaters' legs, intensified skaters' awareness and consciousness of their physique and body. In particular, almost 68% of the skaters reported that their skating uniform made them conscious of their appearance. Similarly, Krane, Waldron, Michalenok, and Stiles-Shipley (2001) suggested that athletic uniforms may increase body concerns, especially if athletes feel that their bodies do not meet the stereotyped ideals of their sport. Athletes equipped with body-tight uniforms, competing in front of spectators are also said to be self-conscious about their physiques (Smiley et al., 2008). Accordingly, self-presentational concerns reflected in social physique anxiety (SPA) have been identified as a potential risk to eating disorder (e.g., Haase, 2009; Haase & Prapavessis, 2001; Hausenblas & Mack, 1999). SPA is underlined by anxiety experienced when individuals perceive their body shape or figure is being negatively evaluated by others (Hart, Leary, & Rejeski, 1989). In particular, Reel and Gill (2001) reported a moderate positive association between SPA and weight concerns. Likewise, Haase, Prapavessis and Owens (2002) reported that SPA independently predicted eating disordered attitudes amongst female athletes, however, SPA was not predictive of eating disordered attitudes amongst male athletes. Haase further reported that SPA predicted eating disorder symptoms such as dieting and bulimia amongst female athletes.

In addition to self-presentation pressures, the athletic identity has also been considered as a potential risk to the development of eating disorders (e.g., Beals, 2004; Jones, Glimtmyer, & McKenzie, 2005; Papatomas & Lavallee, 2006). Identity formulation is said to occur when individuals select certain identities and discard others in accordance with their interests, talents, and values (Erikson, 1968). As such, it is common for athletes to create a narrow, socially constructed identity that is centred on their engagement in sport, as a result of the all consuming dedication required for sporting success (Taylor & Ogilvie, 2001), as

well as the recognition, prestige, and glory associated with an exclusive athletic identity. Subsequently, athletes fail to develop alternative identities and skills, leaving them vulnerable when threats are posed to their uni dimensional self-concept. Through exploratory case studies, both Papatomas and Lavallee, and Jones et al. illustrated real life stories of how disruption in athletes' identity resulted in eating disorders. Specifically, Papatomas and Lavallee conveyed how threats to athletic identity as posed by threats to achievement (e.g., going from being the best player on one team to being of an average standard in another team) accentuated the risk for developing eating disorders. Jones et al. depicted a discourse of how a critical comment made about weight by the coach to a swimmer (whose sole identity was tied to the coach's perception of performances) was a major turning point, whereby the athlete's identity was questioned, and ultimately resulted in the disruption of the athletes' sense of self. Having the state of her body questioned, resulted in the athlete regulating her calorie intake, weight, as well as engaging in other drastic dieting and purging behaviours to achieve the 'ideal' physique and to regain her identity (Jones et al., 2005).

Although these findings are useful and illustrate the specific pressures that athletes may encounter, these studies are largely cross-sectional, and at best demonstrate potential correlates of eating disorders. Furthermore, these studies appear to convey that the cause of eating disorders is singular and occurs in isolation (e.g., sport pressure, comments from significant others). Consequently, in February 2007, UK Sport published an extensive guideline on eating disorders, aimed at practitioners and other key stakeholders working with athletes. In this report, they recognised that "eating disorders usually arise via a complex interaction between vulnerability factors and triggering events" (p. 18). In addition to sport specific factors, they thereby listed three further categories of potential risk factors. These three categories included general vulnerability factors (e.g., concern regarding weight and shape, childhood trauma and adversity, biological and genetic factors), family influences (e.g., parental dieting and obesity, family dynamics, divorce, parental ill health), and individual factors (e.g., low self-esteem, perfectionism, obsessive behaviour, goal orientation). Correspondingly, Petrie and Greenleaf (2007) also suggested that given the dearth in the literature available on potential risk factors amongst athletes, there is a need to draw from the general eating disorder literature and examine context-free psychosocial factors to fully understand the aetiology of eating disorder symptomatology amongst the athletic population. Therefore, the following section will discuss the factors considered to be involved in the development of eating disorders amongst the general population.

1.10. Risk factors and Correlates of Eating Disorders in the General Population

There is extensive research into the processes that contribute to eating disorders, including biological abnormalities and genetics (e.g., Strober, Freeman, Lampert, Diamond, & Kaye, 2000; Wade, Bergin, Tiggemann, Bulik, & Fairburn, 2006), familial factors (e.g., Kluck, 2008; Minuchin, Rosman, & Baker, 1978; Shoebridge & Gowers, 2000), sociocultural factors (e.g., Lindberg & Hjern, 2003; Stice, 1998, 2001; Striegel-Moore, 1997), individual factors (e.g., Cohen & Petrie, 2005; Fairburn, Cooper, Doll, & Welch, 1999; Stice, Mazotti, Weibel, & Agras, 2000) and environmental factors (e.g., Lehoux & Howe, 2007). However, a clear understanding of the precise causes of eating disorders still remain elusive (Polivy & Herman, 2002). Accordingly, Polivy and Herman suggested that the unclear understanding of the causes of eating disorders can be linked to the difficulty of finding suitable samples of eating disorder patients and as a result, a large number of studies have examined correlates of eating disorder symptoms in more or less healthy/normal populations, in the hope that the identified correlates can be argued into causes.

Jacobi, Hayward et al. (2004) further attributed much of the uncertainty around the causes of eating disorders to the definition and inconsistent use of the term ‘risk factor’. A risk factor is considered as ‘a characteristic, experience, or event that, if present, is associated with an increase in the probability (risk) of a particular outcome over the base rate of the outcome in the general (unexposed) population’ (see Kazdin, Kraemer, Kessler, Kupfer, & Offord, 1997, pp. 377). Subsequently, in their review of the risk factors, Jacobi, Hayward et al. reported that more than 30 variables have been reported as putative risk factors for the development of eating disorders. However, they noted that a large number of studies have failed to demonstrate whether these factors preceded the onset of eating disorders, whether they are symptoms of the disorder, maintaining factors, or consequences of the disorder, as the studies were mainly cross-sectional in design. As such, employing the stringent risk factor terminology (see Table 1.4) as put forward by Kazdin et al. and Kraemer et al. (1997), Jacobi, Hayward et al. attempted to establish the status of the empirically highlighted risk factors from a series of cross-sectional and longitudinal studies. It is beyond the scope of this thesis to provide a detailed outline of the findings generated by Jacobi, Hayward et al. however, Table 1.5 contains a brief summary of the risk status of the factors highlighted to be involved in the onset of eating disorders.

Table 1.4. Risk factor typology and identification methods as outlined by Kazdin et al. (1997) and Kraemer et al. (1997)

Term	Definition	Study design
Noncorrelate	No significant association between the factor and outcome	Cross-sectional and longitudinal studies
Correlate	Statistically significant association between factor and outcome	Cross-sectional studies; epidemiological studies, case control studies, family or family history studies
Risk factor	Significant statistical and clinical association between factor and outcome; precedence	Longitudinal studies
Fixed marker	Risk factor that cannot be changed or change spontaneously	Cross sectional studies using data from medical records or birth registers, longitudinal studies (e.g., twin and genetic studies)
Variable risk factor	Risk factor that can be changed or can change spontaneously	Longitudinal studies
Variable marker	Variable risk factor, manipulation does not change the risk of outcome	Randomised clinical trial (preventative or therapeutic intervention study)
Causal risk factor	Variable risk factor, manipulation changed the risk of outcome	Randomised clinical trial (preventative or therapeutic intervention study)

Following the criteria described by Kazdin et al. (1997) and Kraemer et al. (1997), it is clear that a large number of variables put forward as potential causes of eating disorders are not ‘risk factors’ (see Table 1.5), as they have undertaken a cross-sectional study design which makes it difficult to distinguish between cause and effect. Consequently, it seems when applying the term ‘risk factor’ appropriately within the eating disorder literature, the actual number of risk factors is low. In particular, the variables highlighted to cause eating disorders include gender, ethnicity, early childhood eating and digestive problems (e.g., pica, picky eating, eating conflicts and struggles around food time), experiences of sexual abuse or physical neglect, low self-esteem and interoceptive awareness, weight concerns and dieting, changes in psychiatric morbidity as well as high levels of psychiatric morbidity and negative affectivity (see Jacobi, Hayward et al., 2004). In relation to the predictive validity of biological factors, no studies have attempted to establish precedence, with the exception of genetic factors, preterm births, birth trauma, and pubertal timing.

Table 1.5. Risk status of putative risk factors as described by Jacobi, Hayward et al. (2004).

Variable	Risk Status	Rationale
Gender	Fixed marker	The high ratio between females and males in the prevalence of eating disorder (10:1).
Ethnicity	Fixed marker	Ethnicity influences the risk of eating disorders.
Acculturation	Retrospective correlate	Acculturation has been measured cross-sectionally, and although it is presumed to predate the onset of symptoms, the potency is not known.
Age	Variable marker	Peak age of onset is during adolescence and early adulthood.
Weight concerns, dieting, and negative body image	Retrospective correlate (cross-sectional studies)	Studies have demonstrated that the temporal sequence of dieting is related to the onset of eating disorders, however the potency of the link is unclear.
	Variable risk factor (Longitudinal studies)	Whilst controlling for initial eating symptomatology, strong support from longitudinal studies about its precedence.
General psychiatric disturbance and negative emotionality	Retrospective correlate (cross-sectional studies)	Evidence for comorbid disorders is limited to childhood overanxious disorder, social phobia, obsessive compulsive disorder (OCD), and pre-morbid obsessive compulsive personality disorder (OCPD); a large number of studies have failed to employ a control group.
	Variable risk factor & non specific risk factor (Longitudinal studies)	Prior psychiatric morbidity and negative emotionality has been shown to precede the onset of eating disorders, however, it has also been highlighted to precede the onset of other psychiatric disorders (e.g., affective disorders, substance abuse).
Sexual abuse	Non-specific retrospective correlate (cross-sectional studies)	Evidence to suggest that sexual abuse may predate the onset of the disorder. However, no differences were found when comparing individuals with eating disorders to other psychiatric disorders. In addition, results did not vary between clinical and community samples.
	Non-specific variable risk factor (Longitudinal studies)	Only one study has examined the association between sexual abuse and eating problems prospectively and demonstrated that individuals who had experienced sexual abuse or physical neglect during childhood were at elevated risk for eating disorders in adolescence, and early adulthood.

Adverse life events	Non-specific retrospective correlate	Evidence to suggest that patients with eating disorders experience more adverse life events than healthy controls. However, research is limited to cross-sectional studies and there is also evidence to suggest that adverse life events is not specific to eating disorders, but to psychopathology patients in general.
Body Mass index and other weight related variables	Specific retrospective correlate	Evidence to suggest that childhood obesity and parental obesity are related to eating disorders. However, longitudinal studies do not provide support for status as a risk factor.
Early childhood eating and digestive problems	Retrospective correlate (case study)	Early feeding and gastrointestinal problems were more frequent in patients with AN, almost twice as higher than the matched control group.
	Variable risk factor (Longitudinal studies)	Digestive problems, picky eating, pica, eating conflicts, struggles around meals, and unpleasant meals during early childhood have been prospectively linked to subsequent eating disorder symptoms.
Low interoception	Variable risk factor	Scarce evidence on the predictive role of low interoception. However, a small number of studies have found low interoception to prospectively predict disordered eating. Moreover, differences in interoception have been detected between individuals asymptomatic and symptomatic of eating disorders.
Family interaction, family functioning and attachment styles.	Retrospective correlate	Dysfunctional family structure, functioning and insecure attachment styles have been linked to eating disorders. However, prospectively there is no evidence to suggest that family relationship factors are predictive of eating disorders.
Family history and family psychopathology	Correlate	Affective disorders and anxiety disorders are more common in relatives of eating disorder patients. Moreover, parental depression and alcoholism is said to retrospectively predate the onset of BN.
Low self-esteem, negative self-concept, and ineffectiveness	Correlates, with negative self-evaluation as a specific retrospective correlate (cross-sectional studies)	Evidence to suggest that there are deficits in self-esteem and self-concept in patients with eating disorders when compared to patients with other psychiatric disorders. However, studies have failed to control for depression, as self-esteem and depression are highly correlated.
	Variable risk factor (Longitudinal studies)	Prospective studies confirm the presence of a negative self concept, low self-esteem or higher ineffectiveness prior to the onset of eating disorders. Moreover, differences in ineffectiveness were also detected between individuals asymptomatic and symptomatic of eating disorders.

Perfectionism	Correlate	Evidence to suggest elevated perfectionism is common in patients with eating disorders. Moreover, perfectionism is also more common in recovered patients with eating disorders than other psychiatric and healthy controls, but not compared to other patients with eating disorders. However, perfectionism has not been found to prospectively predict elevated eating disorder symptoms, although differences have been detected between symptomatic and asymptomatic eating disorder patients at baseline.
Athletic competition, participation in weight related subculture and exercise	Correlate	A large number of cross-sectional studies have documented a higher prevalence in athletes than non-athletes, however, varying definitions of the disorder have been employed. Moreover, control groups have been infrequently employed, and there is absence of longitudinal studies assessing risk status.
Genetic factors and genes	Fixed markers	Twin studies have demonstrated the genetic effects on eating disorders, with additive genes highlighted to account for 28%-83% of the variance. Higher concordance of eating disorders has also been reported in monozygotic twins than dizygotic twins. However, inconsistency in findings and methodology preclude definitive conclusions.
CNS Serotonin Activity	Correlates	The current inconsistent data cannot prove whether disturbances of serotonergic functioning predates the onset of eating disorders or is a consequence of the dietary abnormalities characteristic of the disorder.
Pregnancy and perinatal complications	Specific retrospective correlate	Complications in pregnancy are not linked to other psychiatric disorders, but have been associated to increased risk for eating disorders.
	Fixed marker	Preterm birth and birth trauma has been found to be prospectively linked to AN, with individuals born preterm at a threefold increased risk. Additionally, obstetrical complications have not been found to be related to patients with schizophrenia, or affective, and reactive psychosis.
Pubertal status	Correlate (weak)	Pubertal status is not a risk factor as everyone goes through puberty. However, there is evidence to suggest that during the peripubertal stage, eating disorders are more likely to be associated to sexual maturation than age. However, given the high correlation between BMI and sexual maturation, it is not clear whether the association between sexual maturation and eating disorder is a result of increasing BMI at puberty, or other aspects of puberty.
Pubertal timing	Non-specific fixed marker	Early pubertal timing and elevated eating disorder symptomatology has been reported in cross-sectional studies, however prospective studies have failed to detect associations.

Thus Jacobi, Hayward et al. concluded that biological factors are correlates at best.

Building upon these findings, Jacobi et al. (2011) prospectively examined potential risk factors over three years in a high-risk sample of 236 college-age women. Specifically, they found that history of depression had the highest potency for predicting the onset of eating disorders, followed by a history of critical comments about eating, weight, and shape by coaches, teachers, and siblings. Further supporting these findings, Polivy and Herman (2002) highlighted that the factors that are most necessary for the development of eating disorders are the presence of body dissatisfaction, negative emotion (e.g., depression and anxiety), markedly low-self esteem, cognitive distortions, and the need for control. Schmidt (2003) argued that while sociocultural pressures may not be necessary, nor sufficient to explain eating disorders, factors such as the shared familial diathesis of behavioural and attitudinal features underlying eating disorders and other psychiatric disorders (e.g., depression, OCD), biological inheritability, perinatal and childhood experiences (e.g., childhood maltreatment, poor parental rearing) and non-shared environmental factors are integrally associated to the development of eating disorders.

Another obstacle considered to be facing research into eating disorders within the general population is the difficulty of combining all reported risk factors into a model that is non unwieldy (Polivy & Herman, 2002), as the causes of eating disorders rarely occur in isolation rather it is a complex web of interactions among biological, environmental, psychological, familial, and developmental factors (Pike et al., 2008). Consequently, a more encompassing and integrative theory of eating disorders has been recently put forward: the transdiagnostic cognitive behavioural theory of the maintenance of eating disorders (Fairburn et al., 2003). Specifically, this theory is evidence based, and embraces a broad range of mechanisms believed to be involved not only in the maintenance of eating disorders, but also in its aetiology. To that end, the following section discusses the key assumptions of the theory to understand the psychosocial processes that are thought to facilitate the onset and maintenance of eating disorders.

1.11. The ‘Transdiagnostic’ Cognitive-Behavioural Theory of the Maintenance of Eating Disorders

A ‘transdiagnostic’ theory of eating disorders has been introduced in the mainstream eating disorders literature in the last decade. Extending the leading evidence based cognitive behavioural theory for the maintenance of BN (see Fairburn, 1981, 1985, 2002; Fairburn, Cooper, & Cooper, 1986), Fairburn et al. (2003) put forward the transdiagnostic theory

founded on the clinical observation that patients with eating disorders frequently migrate from one disorder to another, and the belief that the three types of eating disorders share many distinctive features (see Fairburn et al., 2003; Fairburn & Harrison, 2003). Thus, Fairburn and colleagues proposed that the three ‘distinct’ eating disorders of AN, BN and EDNOS be grouped into one single, unitary diagnostic category known as ‘eating disorders’ (Fairburn & Bohn, 2005) and that ‘eating disorders’ are underpinned by the same five core psychopathological processes. Specifically, they proposed that the psychopathological processes of clinical perfectionism (severe perfectionism), unconditional and pervasive low self-esteem (core low self-esteem), mood intolerance (difficulty coping with intense mood states), and interpersonal difficulties (marked interpersonal problems) all interrelate with the core psychopathology of eating disorders, termed over-evaluation of eating, shape, weight, and their control, to instigate both the development and the maintenance of the disorder (see Figure 1.1).

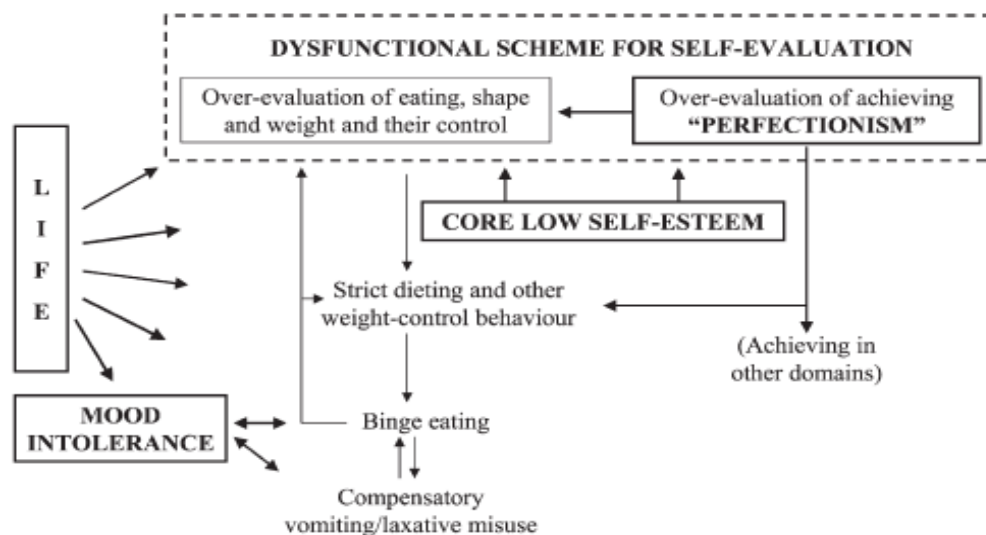


Figure 1.1. A schematic representation of the transdiagnostic theory of eating disorders. ‘Life’ is shorthand for interpersonal difficulties (from Fairburn et al., 2003, Copyright Guilford Press. Reprinted with permission of The Guilford Press).

1.11.1. Core Psychopathology

Central to the theory, Fairburn et al. (2003) proposed that each eating disordered individual uses a dysfunctional system founded on behavioural (e.g., laxative use, self-induced vomiting) and attitudinal characteristics (e.g., preoccupation with food, weight, and shape) for evaluating their self-worth. Fairburn (2008a) noted that this core psychopathology is evident across the eating disorder spectrum and the severity of the core psychopathology is also similar across the diagnostic categories. Moreover, this core psychopathology is

considered to be unlike body shape dissatisfaction which is said to be common amongst the general population rather the core psychopathology is unique/exclusive to the eating disordered population. Thus, while non-eating disordered individuals are likely to evaluate themselves on their performances in several life domains (e.g., sporting ability, school ability), individuals with eating disorders are more likely to evaluate themselves largely and even exclusively in terms of their eating habits, weight, and shape, and their ability to control them (Fairburn, 2008a).

According to Fairburn (2008a), over-evaluation of eating, shape, weight and their control is of primary importance in maintaining the disorder for several reasons. First, most eating disordered individuals are particularly troubled by their weight, body shape, and eating (e.g., Gowers & Shore, 2001; Grilo et al., 2005; Mountford, Haase, & Waller, 2006). Specifically, many eating disordered individuals frequently weigh themselves, readily check and scrutinise their body shape for any perceived imperfections, and diet intensively, while, other individuals avoid weighing themselves, although continuing to be highly concerned about their weight and assuming that they look fat. Second, eating disordered individuals set themselves multiple highly restricted and inflexible dietary rules for their eating practices. These rules generally dictate when they should eat (e.g., not before/after a certain time), the amount they should eat (e.g., less than 600 calories a day), along with what they should eat. Third, eating disordered individuals also engage in driven excessive exercise, which manifests itself in various forms. These include excessive daily exercise (e.g., standing rather than sitting, walking everywhere), exercising normally to an extreme extent (e.g., going to the gym several times a day) and exercising in an abnormal manner (e.g., doing a higher number of sit ups). Finally, individuals with eating disorders also engage in compensatory or non-compensatory purging. In particular, compensatory purging manifests after an episode of eating that the individual perceives as excessive (e.g., bingeing), whilst non-compensatory purging occurs more routinely and is considered a form of weight control. Often these purging behaviours take form in the use of laxatives, diuretics, engaging in self-induced vomiting, or excessive exercise. As a result, the lives of those with eating disorders becomes occupied with constant surveillance (and avoidance) of weight, body shape, and eating, fears of weight gain, as well as engaging in extreme controlled dietary restraint, physical activities and purging behaviours in the pursuit of thinness and weight loss.

1.11.2. Clinical Perfectionism

Shafran, Cooper, and Fairburn (2002) argued that the crucial feature which distinguishes individuals with eating disorders from those that are non-eating disordered is that their levels of perfectionism are dysfunctional, or clinically relevant. As such, they proposed the concept of clinical perfectionism to discriminate between functional, adaptive perfectionism (normal levels of high standards) and dysfunctional/clinically relevant perfectionism where high standards are pursued despite significant adverse consequences (e.g., emotional, social, physical, cognitive or behavioural). Specifically, clinical perfectionism is a confined one dimensional clinical construct, much narrower in its characterisation than multidimensional perfectionism, and refers exclusively to self-orientated and self-imposed perfectionism that causes problems for the daily functioning of individuals (Glover, Brown, Fairburn, & Shafran, 2007; Shafran et al., 2002).

Clinical perfectionism has been defined as the ‘the overdependence of self-evaluation on the determined pursuit of personally demanding, self-imposed, standards in at least one highly salient domain, despite adverse consequences’ (Shafran et al., 2002, pp. 778). Fairburn et al. (2003) further added that at the heart of clinical perfectionism lies another dysfunctional system for self-evaluation, upon which self-worth is judged on the over-evaluation of achieving and achievement. In particular, those with clinical perfectionism, judge themselves largely in terms of striving to achieve demanding goals in an area of life that is important to them, and success in meeting them (Fairburn, Cooper, Shafran, Bohn, & Hawker, 2008). Consequently, if these standards are not met, it results in self-criticism and negative self-evaluation. Thus, it is this strict over-dependence on the self-evaluation of performance, and the ability to tolerate adverse consequences that is said to distinguish clinical perfectionism from the ‘healthy pursuit of excellence’ (Shafran et al., 2002). Similar to the core psychopathology delineating eating disorders, the underlying mechanisms of clinical perfectionism manifests itself in various forms. These include a morbid fear of failure, the rigorous pursuit of success in a valued domain of life, while marginalising other areas of life that are less important (even though this may have adverse consequences on actual performance), setting high self-imposed standards/goals that are embodied by dichotomous rules, a selective focus on ‘failures’, an intense fear of failure to meet personal standards, and constant thoughts about performance (see Riley, Lee, Cooper, Fairburn, & Shafran, 2007; Shafran et al., 2002; Shafran, Lee, & Fairburn, 2004).

Fairburn et al. (2003) stipulated that there is an interaction between clinical perfectionism and core eating psychopathology, with perfectionistic eating disordered individuals applying their perfectionist standards to control their eating, shape, and weight. In particular, perfectionistic eating disordered individuals persistently pursue high standards of control over eating, shape or weight despite the adverse consequences (e.g., being underweight, ridden with hunger), as well as applying dichotomous rules (e.g. I must not eat more than 600 calories per day, I will lose 1lb more today than yesterday). Moreover, they also exhibit fear of failure (e.g., fear of overeating, fear of weight gain), frequent and selective attention to performance (e.g., repeated calorie-counting, frequent shape and weight checking) and negatively biased appraisals of performances which results in self-criticism and negative self-evaluation. This in turn further encourages the striving to control their eating, shape, and weight.

1.11.2.1. The link between perfectionism and eating disorders in the general population.

The proposed link between perfectionism and eating disorders by Fairburn et al. (2003) is not new. Bruch (1978) first said that patients with AN are fulfilling ‘every parent’s and teacher’s idea of perfection’ and as demonstrating ‘pleasing superperfection’ (pp. 59). As such, empirical research exploring the link between perfectionism and eating disorders employing the general population has ascertained an un-refutable link. For example, a number of studies have consistently highlighted that clinical and community samples with eating disorders report significantly higher levels of perfectionism as measured through a variety of perfectionism measures than healthy controls (e.g., Bastiani, Rao, Weltzin, & Kaye, 1995; Halmi et al., 2000; Moor, Vartanian, Touyz, & Beumont, 2004; Stein et al., 2002). In particular, Halmi et al. found that AN patients reported significantly higher perfectionism scores than the healthy controls. Similarly, Lilenfeld et al. (2000) reported that, compared to the controls, patients with a lifetime history of BN reported significantly elevated perfectionism scores. Further strengthening this link, Peck and Lightsey Jr (2008) reported that eating disordered and symptomatic females reported significantly higher scores of perfectionism than asymptomatic females. Likewise Forbush, Heatherton, and Keel (2007) reported that females who self-reported a lifetime history of engaging in eating disordered behaviours such as fasting, self-induced vomiting, laxative and diuretic abuse, and binge eating reported higher levels of perfectionism than females who did not report a life

time history of eating disordered behaviours, while males that reported a lifetime history of fasting reported higher levels of perfectionism than those that did not report a life time history.

Jacobi, Hayward et al. (2004) however, concluded that perfectionism was not a risk factor, but rather a correlate of eating disorder, given the design of many of these studies. Subsequently, a series of recent studies have demonstrated perfectionism to precede the onset of eating disorders (e.g., Bardone-Cone et al., 2007; Bardone-Cone, Weishuhn, & Boyd, 2009; Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2006). Specifically, Tyrka, Waldron, Graber, and Brooks-Gunn (2002) found high levels of perfectionism during childhood to predict eating disorders, and in particular AN symptoms, in early adulthood. Likewise, Steele, Corsini, and Wade, (2007) demonstrated that elevated perfectionism predicted BN symptoms in female students over a three month period. Consequently, this surge in findings led a recent review to conclude that perfectionism may be a predisposing factor preceding and increasing the risk for the development of eating disorders (Lilenfeld et al. 2006).

In addition to being highlighted in the development of eating disorders, elevated scores in perfectionism have also been associated with the severity of the disorder (e.g., Peck & Lightsey Jr, 2008; Sutandar-Pinnock, Woodside, Carter, Olmsted, & Kaplan, 2003), implicated in the maintenance of the disorder (e.g., Cassin & von Ranson, 2005; Egan, Wade, & Shafran, 2011; Stice, 2002), as well as a perceived hindrance to treatment and recovery (e.g., Bardone-Cone, Sturm, Lawson, Robinson, & Smith, 2010; Nilsson, Sundbom, & Hägglöf, 2008). Moreover, elevated perfectionism has been more integrally associated with AN, and BN than other psychiatric disorders (e.g., Bulik et al., 2003; Cassidy, Allsopp, & Williams, 1999; Sassaroli et al., 2008). For example Sassaroli et al. reported that while patients with depression, OCD and eating disorders reported higher maladaptive perfectionism than the non-clinical controls, patients with eating disorders scored significantly higher than patients with OCD or depression. Thus suggesting perfectionism, and in particular the maladaptive indices of perfectionism, are more predictive of eating disorders than of general psychopathology.

Collectively these research findings seem to suggest that elevated perfectionism is more predominant in individuals with eating disorders. Moreover, the current literature also supports Shafran et al.'s (2002) conceptualisation and measurement of clinical perfectionism (i.e., self-orientated subscale of Hewitt's Multidimensional Perfectionism Scale and personal standards subscale of Frost's Multidimensional Perfectionism Scale). Specifically, self-

imposed and self-orientated perfectionism has been frequently identified as the dimension of perfectionism most related to eating disordered behaviours (e.g., Bardone-Cone, 2007; Bento et al., 2010; Brannan & Petrie 2008; Castro et al., 2004). For example, Wade et al. (2008) found that an individual's susceptibility to AN is increased when high personal standards was present. Similarly, Castro-Fornieles et al. (2007) reported that patients with eating disorders have higher self-orientated perfectionism than patients with other internalising psychiatric disorders (e.g., depressive, affective, and anxiety disorders) and healthy controls. In addition, similar findings have been highlighted within community studies (e.g., Bardone-Cone, 2007; Fairburn, Cooper, et al., 1999; Fairburn, Welch, Doll, Davies, & O'Connor, 1997). For example, Shafran, Lee, Payne, and Fairburn (2006) reported that those who actively attempted to set high personal standards and stringently adhered to them, showed more dysfunctional eating attitudes and behaviour than those who did not attempt to adhere to high personal standards. Specifically, they reported that females that were assigned to high standards conditions at work (e.g., get in early, make a "to-do" list and make sure everything was 'ticked off', take minimal breaks, answer emails and calls promptly, stay later than normal) ate fewer high calorie foods, made significantly more attempts to restrict the overall amount of food eaten, and had significantly more regret after eating than those who were assigned to the low personal standards condition.

1.11.2.2. The link between perfectionism and eating disorders in the athletic population.

Within the athletic setting, the topic of perfectionism has been the gradual focus of research for many years (e.g., Frost & Henderson, 1991; Koivula, Hassmén, & Fallby, 2002; McArdle & Duda, 2008; Stirling & Kerr, 2006). While perfectionism has been frequently highlighted as a personality characteristic associated with eating disorders amongst athletes (e.g., Ferrand & Brunet, 2004; McLaren, Gauvin, & White, 2001; Thompson & Sherman, 1999a), the link between eating disorders and perfectionism has only recently gained attention and consequently studies are limited in quantity (e.g., Haase et al., 2002; Hinton & Kubus, 2005; Reinking & Alexander, 2005; Rouveix et al., 2007; Schwarz, Gairrett, Aruguete, & Gold, 2005). Nevertheless, collectively, these studies appear to complement the findings generated within the general population. Specifically, Davis and Strachan (2001) reported that there was no difference in the perfectionism scores of athletes with eating disorders and non-athletes with eating disorders, suggesting that perfectionism plays a salient

role in eating disorders amongst athletes, as well as non-athletes. Likewise, Fulkerson, Keel, Leon, and Dorr, (1999) reported that male and female athletes with higher levels of perfectionism reported greater dietary restraint and greater drive for thinness, respectively, than their counterparts with low levels of perfectionism.

As with the general population, a series of studies have also examined the link between specific components of perfectionism and eating disorders amongst athletes, producing equivocal results (e.g., Haase et al., 2002; Haase, Prapavessis, & Owens, 1999). For example, Ferrand and Brunet (2004) reported that amongst male cyclists, socially prescribed perfectionism and other orientated perfectionism was positively associated to oral control, general eating pathology and dieting respectively. Ferrand, Magnan, Rouveix, and Filaire, (2007) on the other hand, found self-oriented perfectionism to be associated with dietary restraint and body weight dissatisfaction amongst female synchronised swimmers. More recently, Brannan, Petrie, Greenleaf, Reel, and Carter, (2009) revealed that perfectionism, in particular, concerns over mistakes and personal standards were positively associated to BN symptoms, and body dissatisfaction amongst female collegiate athletes.

1.11.2.3. Brief summary of the literature on perfectionism and eating disorders.

In summary, there is empirical evidence to suggest that perfectionism is heavily involved in every acute stage of eating disorders within the general population. A number of studies have shown that individuals with high levels of perfectionism are more likely to report elevated eating disordered pathology in both the general and athletic population. In addition, while it appears that characteristics of clinical perfectionism as purported by Shafran et al. (2002) are more frequently related to eating disorders in the general population, results supporting such links within the athletic setting have been equivocal.

1.11.3. Low Core Self-Esteem

The cognitive behavioural theory of BN proposed a close relationship between low self-esteem and over-evaluations of shape and weight (e.g., Fairburn, 2002). In particular, it was believed that patients with BN have a tendency to view their self-worth in terms of their ability to control their weight and shape through strict and rigid dietary restraint (see Fairburn et al., 1986). Extending this view point, Fairburn et al. (2003) proposed that rather than thinking negatively about themselves in terms of their ability to control their eating, shape and weight, eating disordered individuals possess a long-standing, global unconditional and

pervasive negative view of themselves, which is readily encompassed within their identity. These negative self-judgments are autonomous, with individuals possessing little or no value for themselves as a person, a negative view of the future, as well as feelings of hopelessness, worthlessness, and inadequacy (e.g., Fairburn et al., 2003; Fairburn, Cooper, Shafran, Bohn, & Hawker, 2008). In addition, the low self-esteem remains relatively stable and is independent of performance success, events, and circumstances (e.g., doing well at school). The low self-esteem is also considered to be self-perpetuating, in that it combines the individual's pronounced negative cognitive processing biases with their ability to over-generalise results, in a manner where any perceived failure, is further reinforcement that they are failures as people (Cooper & Fairburn, 2011).

The presence and the intensity of core low self-esteem in eating disordered individuals is believed to result in individuals striving harder to control their eating, weight, and shape in an attempt to retain and/or gain some sense of self-worth (Fairburn, Cooper, Shafran, Bohn, & Hawker, 2008; Murphy, Straebl, Cooper, & Fairburn, 2010). It has also been suggested that low self-esteem interacts with clinical perfectionism, with highly perfectionistic individuals' self-critical and harsh self-evaluation perpetuating a gap between the ideal and actual self, further reinforcing their overall negative view of themselves. This is said to result in eating disordered individuals relentlessly pursuing achievement in their valued domain (often the goal is controlling their shape, eating, and weight) to bolster their negative view of themselves (see Dunkley & Grilo, 2007; Fairburn et al., 2003).

1.11.3.1. The link between self-esteem and eating disorders in the general population.

Like the link between perfectionism and eating disorders, the proposed link between low self-esteem and eating disorders is not new. For example, low self-esteem was first described by Bruch (1962) as a "paralyzing sense of ineffectiveness" (p. 191) forming one of the psychopathologic features of eating-disordered patients. Correspondingly, the association between low self-esteem and eating disorders has been well-established among the general population (e.g., Furnham, Badmin, & Sneade, 2002; Grilo & Masheb, 2005; Grossbard, Lee, Neighbors, & Larimer, 2009; Martijn, Vanderlinden, Roefs, Huijding, & Jansen, 2010; Sheffield, Tse, & Sofronoff, 2005). Specifically, a number of studies have consistently highlighted that clinical samples with eating disorders report significantly lower levels of self-esteem than healthy controls (e.g., Daley, Jimerson, Heatherton, Metzger, & Wolfe, 2008; McFarlane, McCabe, Jarry, Olmsted, & Polivy, 2001; Nollet & Button, 2005;

Silverstone & Salsali, 2003). For example, Cockerham, Stopa, Bell, and Gregg (2009) and Paterson, Power, Yellowlees, Park, and Taylor (2007) found that compared to healthy controls, patients with BN and AN reported lower levels of self-esteem, respectively. Similarly, Blaase and Elklit (2001) found that eating disordered women reported lower levels of self-esteem than healthy controls however, women that have recovered from eating disorders reported similar levels to the healthy controls. Further extending these findings, Jacobi, Paul, de Zwaan, Nutzinger, and Dahme (2004) reported that patients with AN, BN and BED exhibited significantly lower levels of self-esteem than both healthy controls, as well as patients with anxiety and depression. Similar trends have also been noted within the community setting (e.g., Abell & Richards, 1996; Ackard, Cronemeyer, Franzen, Richter, & Norstrom, 2011; Shea & Pritchard, 2007; van den Berg, Mond, Eisenberg, Ackard, & Neumark-Sztainer, 2010). Specifically, Peck and Lightsey Jr (2008) reported that eating disordered and symptomatic females reported significantly lower levels of self-esteem than the asymptomatic group of females. Likewise, Button, Loan, Davies, and Sonuga-Barke, (1997) reported that compared to females that had low eating pathology scores, females with high eating pathology scores reported lower self-esteem.

Consequently, low self-esteem has been identified as a risk factor for eating disorders (see Jacobi, Hayward et al., 2004). Specifically, a large number of studies have shown low self-esteem to precede the onset of eating disorders and their underlying features (e.g., Fairburn, Cooper et al., 1999, Fairburn et al., 1997; Gilbert & Meyer, 2005a). In particular, Button, Sonuga-Barke, Davies, and Thompson, (1996) reported that low self-esteem predicted elevated eating attitudes scores four years later, with adolescent girls within the lowest self-esteem range considered as at an eightfold increased risk for disturbed eating attitudes, than those with high self-esteem. In addition, Cervera et al. (2003) in a large prospective epidemiological study found that girls who reported low self-esteem at baseline were at a more than threefold increased risk for developing eating disorders 18 months later. A more recent study found a moderate, negative correlation between self-esteem and body dissatisfaction for both men and women, and the strength of this relationship remained constant over a 2-year period and across adulthood (Mellor, Fuller-Tyszkiewicz, McCabe, & Ricciardelli, 2010). Subsequently, Mellor et al. concluded that the stability of this relationship indicates that, regardless of age or gender, people with lower self-esteem are more likely to report dissatisfaction with their body shape or size.

The noted interrelationship between clinical perfectionism and low core self-esteem in eating disorders as purported by the transdiagnostic theory (see Dunkley & Grilo, 2007; Fairburn et al., 2003) has also received empirical support (e.g., Sassaroli et al., 2008; Steele et al., 2007; Vohs, Bardone, Joiner Jr, Abramson, & Heatherton, 1999; Vohs et al., 2001). For example, in two separate studies, Vohs and colleagues (1999, 2001) reported that perfectionism and self-esteem interacted to elicit BN symptoms. Specifically, Vohs et al. (1999) found that women who reported higher perfectionism, lower self-esteem and perceived themselves as being overweight at baseline reported greater BN symptoms nine months later. Vohs et al. (1999) also noted that in contrast, high self-esteem buffered against the development of BN symptoms, even if the women were perfectionistic and perceived themselves as overweight. In the second study, Vohs et al. (2001) found that women who reported higher perfectionism, increased body dissatisfaction, and low self-esteem at baseline reported more BN symptoms five weeks later, even after controlling for the effects of depression and anxiety.

Further extending these findings, self-esteem has also been noted to mediate the link between perfectionism and eating disorders. In particular, Borda-Mas et al. (2011) reported that while perfectionism and self-esteem were directly related to body dissatisfaction, the association between perfectionism and body dissatisfaction was also mediated by self-esteem. Similarly, Pratt, Telch, Labouvie, Wilson, and Agras, (2001) found that self-esteem mediated the link between self-evaluative perfectionism and excessive shape and weight concerns amongst a sample of BED patients. Moreover, low self-esteem has also been noted to interplay with other psychopathologies such as depression in the development of eating disorders. In particular, Courtney, Gamboz, and Johnson, (2008) found that whilst controlling for initial problematic eating, the predictive relationship between low self-esteem and problematic eating was mediated through depressive symptoms. Dunkley and Grilo (2007) further consolidated these findings, as well as other relevant findings whereby self-esteem was found to mediate the association between perfectionism and depressive symptoms/distress (e.g., Dunkley, Zuroff, & Blankstein, 2003; Rice, Ashby, & Slaney, 1998). Specifically, Dunkley and Grilo reported that while there was a direct relationship between self-critical perfectionism and over-evaluation of shape and weight amongst a sample of BED patients, such association was also partially mediated by self-esteem and depressive symptoms. Dunkley and Grilo further reported that there was no direct association between

self-esteem and over-evaluation of shape and weight, rather the association was fully mediated through depressive symptoms.

1.11.3.2. Self-esteem and eating disorders in the athletic population.

Within the athletic domain, similar to the research conducted on perfectionism, research is limited on the link between self-esteem and eating disorders, with relatively inconsistent results. Specifically, two lines of research have emerged. First, it has been suggested that athletic participation acts as a protective barrier against the development of low self-esteem, thus inadvertently protecting athletes against the development of disturbed eating attitudes and behaviours (e.g., DiBartolo & Shaffer, 2002; Hildebrandt, 2005; Nudelman, Rosen, & Leitenberg, 1988; Wilkins, Boland, & Albinson, 1991). For example, DiBartolo and Shaffer reported that overall athletes reported higher positive affect and perception of self-worth, as well as fewer eating disorder symptoms and less body image disturbances. In a similar vein, both Reinking and Alexander (2005) and Bachner-Melman, Zohar, Ebstein, Elizur, and Constantini, (2006) reported that participation in sport (and in particular non-leanness sports) appeared to promote self-esteem and offer some protection from a preoccupation with dieting and body dissatisfaction. On the other hand, Berry and Howe (2000) revealed that athletes who reported high restrained eating and high emotional eating reported low self-esteem. Likewise, Engel et al. (2003) reported that athletes with low self-esteem reported greater drive for thinness as well as a higher frequency of engaging in purging behaviours such as diuretics, laxatives, and self-induced vomiting. Similarly, Pritchard et al. (2007) reported that athletes with lower self-esteem displayed more disordered eating, greater body dissatisfaction, and engaged in excessive exercise to control their weight. Pritchard et al. further reported that self-esteem served as a significant predictor of disordered eating, behind body dissatisfaction.

Further corroborating the latter line of argument are studies by Petrie and colleagues (e.g., Brannan et al., 2009; Petrie, 1993; Petrie, Greenleaf, Reel, & Carter, 2009). For example, Petrie first reported that the non-eating disordered gymnasts reported significantly higher self-esteem than the eating disordered gymnasts. Similarly, Petrie et al. reported that lower levels of self-esteem were associated with greater likelihood of displaying eating disordered behaviours amongst female athletes. Brannan et al. further reported that low self-esteem was associated to BN symptoms and body dissatisfaction amongst female athletes.

1.11.3.3. Brief summary of the literature on self-esteem and eating disorders.

In summary, there is evidence from the general population to support the link between low self-esteem and eating disorders as postulated by the transdiagnostic cognitive behavioural theory of eating disorder. Moreover, studies have demonstrated that self-esteem has the capacity to moderate and mediate the association between other psychopathological processes (e.g., perfectionism and depression) and eating disorder symptomatology. Taken together, these findings suggest that low self-esteem is a catalyst upon which psychopathological processes (e.g., perfectionism, depression) and disordered eating behaviours converge. Within the athletic setting, however, there are some conflicting views on the link between self-esteem and eating disorders. Specifically, there is some evidence to suggest that low self-esteem may not be necessary for eating disorders amongst athletes, as athletic participation protects against the development of low-self esteem (e.g., Reinking & Alexender, 2005), as well as evidence to suggest that self-esteem may play a central role in eating disorders amongst athletes (e.g., Brannan et al., 2009; Petrie et al., 2009).

1.11.4. Mood Intolerance

The transdiagnostic cognitive-behavioural theory of eating disorders proposes a complex relationship between emotional states and eating behaviours. Specifically, the model postulates that some patients with eating disorders are extremely sensitive to certain mood states, usually adverse states such as anger, anxiety, and depression, but also intense positive mood states such as excitement. As such, they have difficulty tolerating these states or experience unusually intense mood states, or both (Fairburn, Cooper, Shafran, Bohn, Hawker, Murphy et al., 2008). This is termed mood intolerance. Although it is not known whether individuals with mood intolerance actually experience unusually intense mood states or whether they are just hyper sensitive to them, it is thought that they typically respond to the upcoming change in mood by thinking that they will not be able to effectively cope with the resulting feelings and thoughts, a reaction which further amplifies the triggering mood state (Cooper & Fairburn, 2011).

Subsequently, rather than accepting and managing the changes in mood appropriately, eating disordered individuals engage in what is termed “dysfunctional mood modulatory behaviour” (Cooper & Fairburn, 2011; Fairburn, Cooper, Shafran, Bohn, Hawker, Murphy et al., 2008). These behaviours serve to not only reduce the individuals’ awareness of the triggering mood states and the associated cognitions, but also neutralises it at a personal cost

to individual (Fairburn et al., 2003). The dysfunctional mood modulatory behaviours are considered to manifest mainly in the forms of self-harming (e.g., cutting, punching, or burning themselves) which dissolves the initial mood state, and taking psychoactive substances (e.g., alcohol, tranquilizers) which directly modifies how they feel. However, binge eating, self-induced vomiting, and excessive exercise are also considered to be forms of such behaviours (Fairburn, Cooper, Shafran, Bohn, Hawker, Murphy et al., 2008).

1.11.4.1. Mood and eating disorders in the general population.

While research into the concept of mood intolerance is scarce (e.g., Corstorphine, Mountford, Tomlinson, Waller, & Meyer, 2007), research linking eating disorders and the presence/experience of intense emotional states has been well documented, especially as it pertains to depression (e.g., Polivy & Herman, 2002; Troop, Serpell, & Treasure, 2001). In particular depressive symptoms have been associated to poorer body image (e.g., Finzi-Dottan & Zubery, 2009; Rierdan, Koff, & Stubbs, 1988), greater body dissatisfaction (e.g., Chaiton et al., 2009; Dunkley, Masheb, & Grilo, 2010), greater dissatisfaction with weight (e.g., Tomori & Rus-Makovec, 2000), greater drive for thinness (e.g., Fenning & Hadas, 2010), bulimic pathology and symptomatology (e.g., Burton, Stice, Bearman, & Rohde, 2007; Costa, Ramos, Severo, Barros, & Lopes, 2008; Rowe, Pickles, Simonoff, Bulik, & Silberg, 2002) and disordered eating attitudes and behaviours (e.g., Büyükgöze-Kavas, 2007; Green et al., 2009; Green, Scott, Hallengren, & Davids, 2009; Thomas, James, & Bachmann, 2002). In addition, higher rates of eating disordered behaviours such as bingeing, purging, and dieting have also been noted amongst females who report elevated depressed mood (e.g., Ackard, Neumark-Sztainer, Story, & Perry, 2003; Fulkerson, Sherwood, Perry, Neumark-Sztainer, & Story, 2004; Gutzwiller, Oliver, & Katz, 2003).

Moreover, depression is often considered to be concurrent with eating disorders (e.g., Casper, 1998; O'Brien & Vincent, 2003; Procopio, Holm-Denoma, Gordon, & Joiner Jr., 2006). In particular, the prevalence of depression is expected to be almost three times higher in women with eating disorders compared with non-eating disordered controls (Geller et al., 1998) with the reported prevalence rates for depression (includes point prevalent and lifetime prevalent) in patients with eating disorders ranging between 20% to 95% (e.g., Fletcher, Kupshik, Uprichard, Shah, & Nash, 2008; Fernández-Aranda et al., 2006; Godart et al., 2006; O'Brien & Vincent, 2003). While, it is accepted that there is a strong connection between eating disorders and depression, the nature of the casual relationship is somewhat unclear

(e.g., Keel, Mitchell, Davis, & Crow, 2001; Silberg & Bulik, 2005). Specifically, Stice and colleagues (Stice & Bearman, 2001; Stice, Hayward, Cameron, Killen, & Taylor, 2000) on two separate occasions have reported that body image and eating disturbances predicted depressive symptoms. In particular, Stice et al. found over a 3 year period that body dissatisfaction, BN symptoms, and dietary restraint predicted the onset of major depression in females. Similarly, Stice and Bearman reported that initial body dissatisfaction, dieting, and BN symptoms predicted increases in depressive symptoms at 10 month, and 20 month follow ups. Stice and Bearman subsequently concluded that the prospective nature of both these studies employing different measures and methods to capture depression and eating disordered symptoms, suggest that the relationship between depression and eating disorders is robust, and rules out the possibility that the body image and eating disturbance related risk factors are simply concomitants, or consequences of depression. Further corroborating Stice and colleagues' findings, Marmorstein, von Ranson, Iacono, and Malone, (2008), reported that across adolescence, eating pathology predicted later depressive symptoms, whilst initial depressive symptoms did not predict later eating pathology.

Conversely, Measelle, Stice, and Hogansen, (2006) and Johnson, Cohen, Kotler, Kasen, and Brook, (2002) found depressive symptoms to predict eating pathology. Specifically, Johnson, Cohen, Kotler et al. found that individuals who demonstrated depressive episodes during early adolescence (mean age 13.8), were at elevated risk of developing eating disorders, and associated eating and weight problems (e.g., engaging dietary restraint, self induced vomiting, adhering to a strict diet, and recurrent fluctuations in weight) at middle adolescence (mean age 16.1) and early adulthood (mean age 22). Likewise, Measelle et al. found that initial levels of depressive symptoms at age 13 predicted future growth in eating pathology at later teenage ages (e.g., 14- 18). Further corroborating these findings, Johnson, Cohen, and Kasen (2009) found that individuals with minor depressive disorder at mean age 14 or 16 were at elevated risk for subsequent eating disorders in adulthood.

Alternatively, two studies have found reciprocal prospective relationships between eating disorder symptoms and depression (Presnell, Stice, Siedel, & Madeley, 2009; Stice, Burton, & Shaw, 2004). Specifically, Stice et al. found that initial depressive symptoms predicted BN symptoms, and that initial BN symptoms predicted depression one and two years later amongst females. Similarly, Presnell et al. revealed that depressive symptoms

prospectively predicted increases in BN symptoms, and that initial BN symptoms likewise predicted increases in depressive symptoms in adolescent females over an eight year period. These results collectively imply that BN pathology and depression in adolescent girls are reciprocally related, with each symptom dimension increasing the risk for the onset of the other disorder (Stice et al., 2004).

1.11.4.2. Mood and eating disorders in the athletic population.

Research examining mood, and in particular, depression and eating disorders amongst athletes is limited (e.g., Bravata, Storch, & Storch, 2003; Filaire, Rouveix, Pannafieux, & Ferrand, 2007; Lane, 2003; Rouveix et al., 2007; Terry, Lane, & Warren, 1999), nonetheless, findings are relatively similar in nature to the general population. While, Bravata et al. reported that depression was not related to eating disorder symptomatology amongst intercollegiate athletes, Terry et al. reported that depression predicted elevated disturbed eating attitudes in elite rowers. The authors reported that depression accounted for 24% of the variance in the athletes' perception about their body shape and 9% of their eating pathology scores. Extending this, Lane revealed depression as the most influential predictor of disturbed eating attitudes amongst student athletes, compared to other mood states such as anxiety and tension. In particular, Lane reported that depression accounted for 38% of the variance in male athletes' eating pathology scores and 29% in the female athletes' eating pathology scores. Further corroborating these findings, Filaire et al. reported that depression accounted for 64% of the variance in athletes' eating pathology scores, and 73% and 45% of the variance in bulimia and dieting scores, respectively. Moreover, all of these aforementioned studies noted that depression influenced eating disorder symptomatology in a positive linear manner, suggesting that as depression levels increase, athletes' disturbed eating attitudes and behaviours also increases.

1.11.4.3. Brief summary of the literature on mood and eating disorders.

In summary, empirical evidence embedded in cross-sectional studies employing both clinical and community samples have demonstrated that there is a strong connection between depression and eating disorders in the general population. Moreover, many studies have highlighted that depression often develops concurrently with eating disorders (e.g., O'Brien & Vincent, 2003). Although, determining the causal relationship between eating disorders and depression has proven to be somewhat difficult within the general population, studies are

generally suggestive of a shared prospective association between eating disorders and depression. Within the athletic setting, studies examining the link between depression and eating disorders are limited, although findings generated seem to mirror those of the general population.

1.11.5. Interpersonal Difficulties

The role of interpersonal difficulties in eating disorders has been described in four ways in the transdiagnostic cognitive-behavioural theory. First, *family interpersonal dynamics* are thought to be important, and it has been proposed that when tensions and conflicts exist within the family, the individual's resistance to eating is likely to be intensified. Specifically, it has been argued that this reflects a short-term intensification of the individuals' need for a sense of "control" (Fairburn, Shafran, & Cooper, 1999). Second, *long-term interpersonal difficulties* are thought to undermine self-esteem, resulting in individuals striving harder to meet valued goals (e.g., success at controlling eating, shape, and weight). Third, *interpersonal environments* that magnify weight and shape concerns are seen to exacerbate the disorder (e.g., families with a previous history of eating disorders and occupations where there is pressure to be slim). Finally, it has been noted that *adverse interpersonal events* such as the death of a loved one or a close family member, and abuse may serve as potential precipitators of eating disorders.

1.11.5.1. Interpersonal difficulties and eating disorders in the general population.

Difficulties in interpersonal functioning have been linked to eating disorders since the earliest conceptualisation of the disorder (e.g., Bruch, 1973; Gull, 1874). Furthermore, empirically, numerous observational, clinical, and community studies have lent support to the significance of interpersonal difficulties and to Fairburn et al.'s (2003) observations of their contribution. Overall, these studies highlight that those with eating disorders report more problematic family dynamics (see McIntosh, Bulik, McKenzie, Luty, & Jordan, 2000, for a review), as well as long-term interpersonal difficulties stemming from problematic early childhood experiences such as attachment difficulties, enduring internal problems related to social functioning and social isolation (e.g., Chassler, 1997; Cooper, Whitehead, & Boughton, 2004; McIntosh et al., 2000; Striegel-Moore, Silberstein, & Rodin, 1993). A higher occurrence of eating disorders among families with a history of eating disorders (e.g.,

Strober et al., 2000), as well as higher incidences of sexual, physical, and emotional abuse (e.g., Kent, Waller, & Dagnan, 1999; Schmidt, Tiller, & Treasure, 1993; Smolak & Murnen, 2002) have also been reported.

1.11.5.1.1. Family interpersonal dynamics and eating disorders in the general population.

A number of studies have focused on the individual characteristics of the mother and of the father as being the cause of the disorder, with mothers often described as demanding and perfectionistic, hypercritical, intrusive, overprotective, and controlling, while fathers on the other hand are reported to be emotionally constricted, distant, weak, passive, dominant, angry, violent, rigid, and unreachable (see Haworth-Hoepfner, 2000). However, the majority of the studies have focused on interpersonal relationship dysfunction in the parental rearing style and family structure (McIntosh et al., 2000), with the dynamics within the eating disordered family described as more disturbed, pathological or dysfunctional than controls (Jacobi, Hayward et al., 2004). Specifically, the familial interpersonal dynamics are considered to be embedded within an overprotective family structure, where enmeshed and blurred intergenerational boundaries, rigidity in interactional patterns, and lack of conflict resolution and control are the norm (Bruch, 1973; Lieberman, 1989; Minuchin et al., 1978). Moreover, in comparison to healthy controls, AN patients report their familial relationships as characterised by a double message of affection and neglect (e.g., Wonderlich, Ukestad, & Perzacki, 1994), less caring and more controlling (e.g., Rhodes & Kroger, 1992), over protective (e.g., Kinzl, Traweger, Guenther, & Biebl, 1994), less adaptable and cohesive (e.g., Waller, Slade, & Calam, 1990; Wisotsky et al., 2003), and emotionally over-involved (e.g., Kyriacou, Treasure, & Schmidt, 2008). While, BN patients characterised their relationships with their family as being isolated (e.g., Humphrey 1986), less adaptable and cohesive (e.g., Blouin, Zuro, & Blouin, 1990; Latzer, Hochdorf, Bachar, & Canetti, 2002; Waller, Calam, & Slade, 1988), more chaotic, hostile, and conflictual (e.g., Kinzl et al., 1994; Ordman & Kirschenbaum, 1986), lack of trust and nurturing (e.g., Humphrey 1987; Humphrey, Apple, & Kirschenbaum, 1986) as well as less expressive and communicative (e.g., Kent & Clopton, 1992; Laliberté, Boland, & Leichner, 1999).

Since the earliest descriptive studies conducted on family functioning, parent-child relationships characterised by high levels of conflict and low levels support have been frequently implicated in eating disorders (e.g., Benninghoven, Schneider, Strack, Reich, &

Cierpka, 2003; Garner, Garfinkel, & O'Shaughnessy, 1985; Humphrey, 1987, 1988). Accordingly, Fairburn, Cooper et al. (1999) reported that eating disordered patients were five times more likely to report arguments and conflict within their parental relations than healthy controls. Likewise, Crowther, Kicher, Sherwood, and Kuhnert, (2002) reported that high levels of parental/familial conflict were related to elevated BN symptoms. More recently, Wilksch and Wade (2010) reported that the higher the levels of conflict experienced with parents, the greater the importance placed on shape and weight. Adding to this, Wade, Gillespie, and Martin (2007) revealed that women with BN reported greater levels of parental conflict while they were growing up than their unaffected twin. Moving beyond the reports of patients which can be impinged by their disorder, Sim et al. (2009) relied on the reports of the mothers of eating disordered patients. Specifically, Sim et al. revealed that while mothers of diabetes patients reported similar levels of conflict within their family to that of the control group, the mothers of AN patients reported greater levels of conflict than both groups.

While the literature available on parental support is not as extensive as parental conflict, the findings generated mirror that of the link between parental conflict and eating disorders. For instance, Tiller et al. (1997) found that eating disorder patients reported less support from parents (and close others) than a healthy control group. Specifically, Tiller et al. found that both AN and BN patients reported lower levels of emotional and practical support than the control group. In further support of these findings, Rorty, Yager, Buckwalter, and Rossotto (1999) found that the healthy control women reported significantly greater levels of perceived emotional support from parents (and other family members) than either BN or recovered BN groups. The two BN groups were also not found to differ in their perception of support received from parents (and other family members). Correspondingly, Grissett and Norvell (1992) examined the influence of both social support and conflict in parental relationships, and further consolidate the aforementioned findings. Specifically, they revealed that BN women reported lower levels of perceived social support, as well as higher levels of conflict in their parental relationships than the control group. Moreover, these differences were also noted to remain statistically significant after controlling for the effects of psychopathology. Similar findings were observed by Hodges, Cochrane, and Brewerton (1998), who reported that eating disordered patients reported their familial relations as less supportive, and more conflictual, than the normative controls.

Other aspects of the parent-child relationship often conceptually and empirically related to eating disorders include the lack of autonomy from parents, as well as over-

involvement and intrusiveness from parents (see Latzer, Lavee, & Gal, 2009). As such, these aspects of the parent-child relationship have been linked to eating disorders from the very earliest conceptualisation of the disorder. For example, Bruch (1973) and Minuchin et al. (1978) postulated that eating pathology (in particular AN) stem from little or no encouragement of independence/autonomy, as well as an overprotective and intrusive family environment. Moreover, O’Kearney (1996) suggested that problems with autonomy and separation from parents may be important factors in the development and maintenance of eating disorders. Accordingly, a number of empirical studies have further reinforced the aforementioned links (e.g., De Panfilis, Rabbaglio, Rossi, Zita, & Maggini, 2003; Perry, Silvera, Neilands, Rosenvinge, & Hanssen, 2008; Schmidt et al., 1993; Strong & Huon, 1998). Specifically, Bonne et al. (2003) reported that women with BN described their parents as affectionately controlling, whereby the parents did not exhibit care and warmth towards the individual, but at the same time exerted domineering behaviours. Adding to this, both Calam, Waller, Slade, and Newton, (1990) and Canetti, Kanyas, Lerer, Latzer, and Bachar, (2008) found eating disordered patients to report higher levels of control in their parental relationship and in particular in their relationship with their father. Conversely, both Walters and Kendler (1995) and Swanson et al. (2010) reported that high maternal control was related to AN rather than high paternal control. Extending these findings, Blair, Freeman, and Cull (1995) demonstrated that AN patients reported high levels of protection, as well as higher emotional involvement from their parents (in particular the mother) than healthy controls. It was further reported that levels of involvement were positively related to the severity of the illness. However, Blair et al. noted that the observed patterns may not be specific to AN, as the levels of involvement experienced by the AN patients and their families were similar to the ratings provided by patients with cystic fibrosis. Hodes, Dare, Dodge, and Eisler (1999) further reported that mothers of eating disordered patients are more likely to be over-involved than fathers.

In a series of studies Rorty and colleagues (Rorty, Yager, & Rossotto, 1993; Rorty, Yager, Rossotto, & Buckwalter, 2000) examined the intrusiveness and involvement of parents in BN patients. Rorty et al. (1993) reported that BN women (both recovered and active) tended to characterise their parents not as globally intrusively over-involved or globally emotionally under-involved, but rather their parents were intrusively involved in specific areas where the daughters wished for greater personal privacy and autonomy (e.g., concerning private space; control over personal appearance, including weight and shape; and

private thoughts and feelings). On the other hand, parents were described as emotionally under-involved in areas where the daughters wished for greater personal closeness and attunement (e.g., emotional support and autonomy-facilitating guidance). Guided by these findings, Rorty et al. (2000) reported that women with a lifetime history of BN expressed higher levels of intrusive involvement from their mothers and their fathers relative to the comparison group. Rowa, Kerig, and Geller, (2001), on the other hand, reported that women with AN were more likely to report their father as more intrusive and over-involved than non eating-disordered women. In contrast, these findings have not been replicated in the community setting. Specifically, McVey, Pepler, Davis, Flett, and Abdoell (2002) reported that while low conditional involvement was related to high levels of disordered eating, the level of involvement received from mothers was not related to disordered eating, but levels of involvement from fathers were. Furthermore, McVey et al. noted that under conditions of high levels of school-related stress, high, as compared to low, levels of paternal involvement appeared to lower the risk of disordered eating. This finding indicates that the quality of the father/daughter relationship, namely the degree of involvement and of the conditionality of support on the part of the father, might have an additive influence on girls' eating behaviour for those facing stressful circumstances. It would appear that high levels of involvement and unconditional support from fathers is the most optimal to help reduce the negative impact of stress, which then reduces the risk of girls engaging in unhealthy eating behaviours.

A few prospective studies have investigated the effects of family functioning on the onset of eating disorders at later life, however the results have not been convincing, with some linking dysfunctional family dynamics to later eating psychopathology (e.g., Beato-Ferández, Rodríguez-Cano, Belmonte-Lario, & Martínez-Delgado, 2004; Calam & Waller, 1998; Johnson, Cohen, Kasen, & Brook, 2002) and others not (e.g., Attie & Brooks-Gunn, 1989; Button et al., 1996; Graber, Brooks-Gunn, Paikoff, & Warren, 1994; McKnight Investigators, 2003; Nicholls & Viner, 2009). For example, Calam and Waller reported that poor communication, poor perceived levels of role differentiation, high controlling parental behaviours, and general family dysfunction were related to BN attitudes and behaviours seven years later. However, Calam and Waller failed to take into account the participants' initial eating disturbances scores, thus, it is difficult to know whether dysfunctional family relationships contributed to the development of unhealthy eating behaviours beyond the initial eating psychopathology scores. Similarly, Johnson, Cohen, Kasen et al. (2002) reported that while the association between maladaptive maternal behaviour was not

associated to the risk of eating disorders amongst adolescents, adolescents who experienced maladaptive paternal behaviour were approximately three times as likely as those who did not experience any maladaptive paternal behaviours to have eating disorders during adolescence or early adulthood. Finally, May, Kim, McHale, and Crouter (2006) reported that over the course of three years, increases in conflict with the mother were linked to increases in weight concerns for girls, while increases in father-child conflict was related to both boys' and girls' weight concerns.

On the other hand, Attie and Brooks-Gunn (1989) and Graber et al. (1994) both reported that family dynamics did not further predict disordered eating attitudes and behaviours at two and four years later, respectively, while taking into account the initial eating attitudes and behaviour scores of participants. In particular, Attie and Brooks-Gunn reported that after controlling for initial eating pathology scores, only T1 body image significantly and negatively predicted a gain in eating problems. The quality of the family relationship (as measured by expressiveness, cohesiveness, conflict, organisation, and control) did not contribute to the prediction of eating pathology scores over two years. Likewise, the McKnight Investigators (2003) reported that high preoccupation with having a thin body, concerns about weight, shape, and eating significantly predicted the onset of eating disorders in young women in middle and high school, while parental influence and social support did not. In a more recent study which examined the associations between childhood risk factors and self-reported AN at 30 years, Nicholls and Viner (2009) concluded that parenting styles did not predict AN, rather gender, infant feeding problems, maternal depressive symptoms and a history of under-eating predicted AN.

While it appears that family dysfunction is associated with eating disorders, it is often the mother-child relationship that has generated the most attention (e.g., Calam & Waller, 1998; Pike & Rodin, 1991). However, there is emerging evidence to suggest that father-child relationships are also associated with eating disorders (e.g., Jones, Lueng, & Harris, 2006; Klump, Wonderlich, Lehoux, Lilenfeld, & Bulik, 2002; Meyer & Gillings, 2004; Rodgers & Chabrol, 2009). For example, Calam et al. reported that while eating disordered females reported elevated levels of protection and lower levels of warmth and care than the control group, the eating disordered patients reported their fathers as more overprotective than their mothers. Extending this, Johnson, Cohen, Kasen et al. found that low paternal affection, low paternal communication, and low paternal involvement predicted the onset of eating disorders

in adolescence and early adulthood, whilst maladaptive maternal behaviours was not associated with such risk.

In addition to determining the association between family interpersonal dynamics and eating attitudes and behaviours, a small number of researchers have explored the influence of other significant interpersonal relationships such as romantic and marital relationships (e.g., Boyes, Fletcher, & Latner, 2007; Sanchez, Good, Kwang, & Saltzman, 2008), friendships/peers (e.g., Gerner & Wilson, 2005; Schutz & Paxton, 2007) and sibling relationships (e.g., Lehoux & Howe, 2007; Murphy, Troop, & Treasure, 2000) on eating disorders. In particular, findings have demonstrated significant links between the quality of these interpersonal relationships, and disturbed eating pathology, with the consensus that poor quality relationships and relationship concerns are related to disturbed eating attitudes. For example, Boyes et al. found that females' relationship satisfaction was positively related to healthy dieting and that males who reported greater satisfaction with their relationship had female partners that were more satisfied with their body and who dieted less. Similarly, Schutz and Paxton reported that friendship qualities such as trust and alienation were associated to BN symptoms (even after controlling for depression). Moreover, Schutz and Paxton reported that girls who displayed higher body dissatisfaction and eating disordered symptoms also reported higher levels of friend alienation than those who reported low body dissatisfaction and eating disordered symptoms. In addition, those who reported high levels of BN symptoms reported high levels of friend conflict than those that reported low levels of BN symptoms. However, these differences were eliminated when depression was accounted for statistically. In relation to the influence of the quality of the sibling relationships, Lehoux and Howe (2007) found that BN women characterised their relationship with their sister as close, caring, antagonistic, as well as underlined by jealousy (of their non-eating disordered sister).

Support for the influence of the quality of other significant relationships is also evident in a small number of prospective studies. For example Thelen, Farmer, Mann, and Pruitt (1990) reported that women's satisfaction with their relationship with men was negatively related their BN symptomatology. Moreover, it was reported that reduction in BN symptoms was related to higher satisfaction with the relationships maintained with males. These findings remained consistent at the 31 month follow up (Thelen, Kanakis, Farmer, & Pruitt, 1993). Likewise, Stice and Whitenton (2002) reported that perceived social support from parents and peers predicted increases in body dissatisfaction one year later, with initial

low social support related to increases in body dissatisfaction. However, these findings have not been replicated in a more recent study. Specifically, Ferriter, Eberhart, and Hammen (2010) found that the quality of romantic and close peer relationships did not predict changes in eating pathology scores after controlling for initial depression scores five years later. Consequently, it has been suggested that while the aforementioned relationships (e.g., romantic, peer) may exert a small effect on eating behaviours, they are not comparable to the effects of eating disordered individual's familial relationships, which is considered to have a much greater influence (e.g., Field et al., 2001; Worobey, 2002). Specifically, Worobey reported that relationships with romantic partners (in particular the nature of the relationship) may place college women at risk for maladaptive eating attitudes, but women's memories of the familial environment (especially during meal times) exerted a greater influence. However, it should be noted that in a prospective study, Stice, Presnell, and Spangler, (2002) found low social support from peers, but not parents, predicted binge eating onset two years later.

1.11.5.1.2. Long-term interpersonal difficulties and eating disorders in the general population.

No specific details were provided by the transdiagnostic cognitive behavioural theory as to what constitutes examples of *long-term interpersonal difficulties*. However, other authors have related it to more enduring, internal interpersonal issues related to social functioning and social isolation (e.g., Cooper et al., 2004; Hartmann, Zeeck, & Barrett, 2010; McIntosh et al., 2000). For instance, McIntosh et al. concluded that apart from problems related to family functioning, individuals with eating disorders also demonstrate high levels of social anxiety, view themselves as socially incapable in comparison to others, and feel socially withdrawn/isolated. Thus, long-term interpersonal difficulties can be conceptualised as internal interpersonal problems that are enduring, and trait like/dispositional, which governs individuals' social functioning (i.e., behaviours), and sense of self (i.e., cognitions). Guided by this extended description, three primary indices of long-term interpersonal difficulties were identified as key, and fulfilling the above description, and subsequently examined in this thesis: attachment styles, social anxiety and trait loneliness.

1.11.5.1.2.1. Attachment styles and eating disorders in the general population

Attachment theory (Bowlby, 1969, 1973, 1988) reflects how an individual connects with others (see Friedberg & Lyddon, 1996; Tasca, Balfour, Ritchie, & Bissada, 2007; Tasca, Taylor, Bissada, Ritchie, & Balfour, 2004). An individual's attachment style is said to characterise "human behaviour from cradle to the grave" (Bowlby, 1979, p. 129).

Accordingly, attachment styles are rooted in early life experiences with a primary caregiver, who is often the mother, and underlines the emotional connection between these two people. The emotional connection reflects the caregiver's ability to respond and supply a secure base of protection, comfort, and support, especially during periods of distress and threats (Bowlby, 1969). Correspondingly, these experiences lead to the development of attachment security or insecurity further categorised as anxious-ambivalent, and avoidant (Ainsworth, Blehar, Waters, & Wall, 1978). The secure attachment style is a manifestation of early experiences whereby the infant consistently received and was able to rely on their caregiver for support, comfort, and protection. The anxious-ambivalent attachment style is a reflection of early experiences marred by uncertainty, anxiety, and 'clinginess', stemming from the inconsistent behaviours of the caregiver in terms of responsiveness, support, and security. Finally, the avoidant attachment manifests from early experiences marked by neglect and rejection by the primary caregiver.

Based on the child's bibliography of the 'event-based relationships' with primary caregivers (Main, Kaplan, & Cassidy, 1985), Bowlby (1969) proposed the concept of internal working models as a mechanism through which attachment styles can affect a person throughout life. These internal working models are the result of accumulated memories of either successful or unsuccessful attempts to gain proximity (Shemmings, 2006) and are considered to remain relatively stable from childhood to adulthood, although not in a fixed, deterministic manner (Bowlby, 1973). Therefore, based on the experiences with their primary caregiver, a *securely attached* child internalises a positive internal model of self, possessing a strong sense of self-worth, assertiveness, and autonomy, further viewing themselves as lovable and special, and holding a model of others as being trustworthy, accessible, and dependable. However, those that have developed an *anxious-ambivalent attachment* tend to develop negative models of themselves as unworthy and incompetent, and a negative internal working model of others as being emotionally unavailable, untrustworthy, undependable, and inconsistent in their behaviour, while those that have developed an *insecure avoidant attachment* develop a fallacious positive model of themselves, viewing

themselves as self reliant, worthy, unique and hold a critical negative working model of others, viewing others as ordinary (unlike themselves), insincere, unsavoury, and inadequate.

These internal working models are reported to govern patterns of cognitions, affect and behaviour and have been further noted to lay the foundation in determining an individual's degree of vulnerability to the development of psychopathology (e.g., Bowlby, 1973, 1988), with disruptions in attachment styles (insecure attachment) being highlighted as central to the development of both childhood and later adulthood psychopathology, including eating disorders. For instance, Bruch (1973) argued that at the heart of AN lies a parent-child (mother-child) relationship characterised by responses from the parent that do not meet the needs of the child. Correspondingly, there is a large body of work linking insecure attachment styles to eating disorders (see O'Kearney, 1996; Ward, Ramsay, & Treasure, 2000; Zachrisson & Skårderud, 2010 for a review). Specifically, the onset and maintenance of eating disorders has been linked to early attachment experiences, separation, and individuation from the attachment figure during adolescence and upholding of insecure attachments in adult relationships (see Friedberg & Lyddon, 1996). As such, studies have reported a significant link between disruptive early childhood attachment experiences and eating disorders (e.g., Armstrong & Roth, 1989; Meesters, Muris, Hoefnagels, & van Gemert, 2007; Orzolek-Kronner, 2002; Tereno, Soares, Martins, Celani, & Sampaio, 2008), as well as to attachment disruptions in close and romantic relationships (e.g., Bamford & Halliwell, 2009; Broberg, Hjalms, & Nevenon, 2001; Cash, Thériault, & Milkewicz-Annis, 2004; Eggert, Levendosky, & Klump, 2007; McKinley & Randa, 2005; Ramacciotti et al., 2001; Ward, Ramsay, Turnbull, Benedettini, & Treasure, 2000).

Specifically, eating disordered individuals are reported to have experienced early attachment figures as significantly less responsive, available, trustworthy, caring, autonomous, and more rejecting and abandoning than healthy individuals (see Chassler, 1997). For example, Kenny and Hart (1992) reported that eating disordered women characterised their parents as less supportive of their independent strivings, as more emotionally negative, and were less likely to offer comfort during times of distress. Furthermore, in a more recent comprehensive study, Lehoux and Howe (2007) found that BN women reported more insecure attachment to their parents and in particular to their fathers than their non-eating disordered sister. Moreover, when assessing the contribution of non-shared environmental factors (e.g., paternal insecure attachment, narcissism, affective

instability, impulsivity, and shape and weight related teasing) to BN, Lehoux and Howe reported that after controlling for depression and anxiety, paternal insecure attachment increased the likelihood of BN by tenfold. Likewise, eating disordered individuals are reported to perceive their relationships with close others and romantic partners as marred by fears of rejection, uncertainty, abandonment and intimacy; discomfort with relationship closeness, experiences of frustration, jealousy, clinginess, and less satisfaction with their relationships (see Evans & Wertheim, 1998, 2005). For example, Elgin and Prichard (2006) reported that while individuals who exhibited secure attachment were less likely to report body dissatisfaction and drive for thinness (and BN symptoms for males), females who scored high in avoidant attachment were more likely to report BN symptoms. Likewise, Eggert et al. (2007) further reported that anxiety about current romantic partners was related to disordered eating indices such as body dissatisfaction, engaging in compensatory behaviours, binge eating and preoccupation with weight.

There is also some evidence to suggest that attachment styles may have a causal relationship with eating disorders. For example, Burge et al. (1997) found that insecure attachment cognitions about intimate partners, parents, and peers were related to eating disorder symptomatology 12 months later. Further corroborating these findings, Tasca et al. (2006, 2007) reported that improvements in attachment insecurity during group therapy for BED predicted improvements in BED symptoms (e.g., reduction in the number of days binged). However, these findings have not been replicated in a more recent study (Ferriter et al., 2010).

1.11.5.1.2.2. Social anxiety and eating disorders in the general population.

Preoccupation with appearance (e.g., a constant concern with how the physical self is viewed by others) is considered to be a symptom of eating disorders (see Haase & Prapavessis, 1998). It has also been proposed that beneath this preoccupation, manifests symptoms related to the pervasive concern with how others view the self in general (see Striegel-Moore et al., 1993). Specifically, eating disordered patients are thought to be preoccupied with self-presentation, and with how others perceive and evaluate them. This is often designated as social anxiety. Social anxiety manifests as a fear of social situations, where individuals perceive themselves to be vulnerable to negative evaluation by others (Lépine & Péliissolo, 2000) and are concerned that other people see them as inferior in some

way (Beck, Emery, & Greenberg, 1985). It has been suggested that individuals with elevated social anxiety or riddled with the persistent fear of being negatively evaluated by others would be more likely to behave in ways that avoid the possibility of unfavourable evaluations (Paxton, Schutz, Wertheim, & Muir, 1999).

Social anxiety is considered common in patients with eating disorders (e.g., Bulik, Beidel, Duchmann, Weltzin, & Kaye, 1991; Hinrichsen Wright, Waller, & Meyer, 2003; Swinbourne & Touyz, 2007), frequently suggested to precede the development of eating disorders (e.g., Bulik, Sullivan, Fear, & Joyce, 1997; Kaye et al., 2004) and seen as a barrier to engage in treatment (Goodwin & Fitzgibbon, 2002). Specifically, Bulik et al. (1991) reported that eating disordered patients endorsed higher levels of social anxiety than controls and clinically significant social fears that were equal in intensity to those with social phobia. Thus Bulik et al. (1991) concluded that eating disordered patients' fears of negative evaluation are not specific to eating, their shape or weight, but to a range of social situations. Further supporting these findings, Hinrichsen et al. demonstrated that levels of social anxiety in AN and BN patients were significantly higher than controls and that social anxiety was related to higher levels of eating disordered symptoms.

Correspondingly, although research on social anxiety and eating disorders is limited, there is a growing body of research that suggests that social anxiety and eating disorder symptoms and related pathology are integrally associated (see Bulik, Sullivan, Carter, & Joyce, 1996; Kimbrel, Cobb, Mitchell, Hundt, & Nelson-Gray, 2008; Mclean, Miller, & Hope, 2007; Utschig, Presnell, Madeley, & Smits, 2010; Wonderlich-Tierney & Vander Wal, 2010). For example, Cash et al. (2004) reported that a negative body image was related to greater discomfort and concerns about approval and acceptance in social interactions. Correspondingly, in a series of studies both Hinrichsen and colleagues (Hinrichsen et al., 2003; Hinrichsen, Sheffield, & Waller, 2007; Hinrichsen, Waller, & van Gerko, 2004) and Gilbert and Meyer (2003, 2005a, 2005b) reported that unhealthy eating attitudes and behaviours were linked to increased social anxiety. In particular, Hinrichsen et al. (2003) noted that increased social anxiety was related to BN pathology amongst the non-clinical and BN samples. Likewise, heightened levels of social anxiety were found to be related to greater restrictive attitudes and body dissatisfaction (Gilbert & Meyer, 2003, 2005b) and bulimic attitudes (Gilbert & Meyer, 2005a).

1.11.5.1.2.3. Loneliness and eating disorders in the general population.

Individuals with clinical eating disorders or with problematic eating attitudes and behaviours are considered to lead secret and lonely lives (see Pipher, 1995). In particular, these individuals are likely to separate themselves from close relationship members as their obsession with these unhealthy behaviours heighten. Loneliness is perceived as a distressing psychological experience that occurs when there is a discrepancy between one's desired and actual social network (Peplau & Perlman, 1982). It is seen as the result of the individual's perceptions of being socially isolated, disconnected from others and 'not fitting in' (Doane & Adam, 2010) as well as the result of the lack of social skill and competence to begin and develop close interpersonal relationships (Jones, Hobbs, & Hockenbury, 1982). Accordingly, two types of loneliness have been identified: state and trait loneliness (Weiss, 1973). State like loneliness reflects transient experiences of loneliness in specific circumstances or interactions, whilst trait loneliness is more stable and enduring and is not specific to a context. It is widely accepted that trait loneliness resulting from a deficiency in an individual's social relationships threatens mental health (e.g., Doane & Adam, 2010; Peplau & Perlman, 1982). Correspondingly, it has also been reported that early onset of loneliness may act as an impetus in the development of eating disorders (Pritchard & Yalch, 2009), as well as contributing to a relapse in eating disordered patients seeking treatment (Stewart, 2004).

In a cohort of retrospective studies, Fairburn and colleagues (see Fairburn, Cooper et al., 1999, Fairburn et al., 1997, 1998) reported that women with AN, BN and BED reported having an impoverished social environment such as having no close friends during childhood in comparison to healthy controls. Lending further support, Karwautz et al. (2001) revealed that sisters with a history of AN were more likely to report having had no close friends in childhood than their unaffected sisters. Troop and Bifulco (2002) further reported that women with AN, in particular the binge/purge subtype reported greater feelings of loneliness in adolescence than the healthy control group. Moreover, levels of loneliness have been noted to be higher in patients with eating disorders in comparison to other psychiatric groups (Esplen, Garfinkel, & Gallop, 2000).

While there appears to be a strong link between loneliness and eating disorders, empirical evidence favouring such link is still in its infancy. In particular, studies have primarily examined the contribution of loneliness to binge eating (e.g., Masheb & Grilo, 2006; Rotenberg & Flood, 1999). Findings demonstrated that increased feelings of loneliness

led to increased consumption of food in restrained eaters (Rotenberg & Flood, 1999) and a desire to binge in BN patients (Tuschen-Caffier & Vögele, 1999). In addition, Masheb and Grilo found that loneliness was related to the frequency of binge eating episodes, as well as concerns about shape, weight, and eating amongst males and females. In a more recent study, Pritchard and Yalch (2009) reported that loneliness was related to greater drive for thinness, body dissatisfaction and BN attitudes amongst males, while loneliness was related to greater body dissatisfaction amongst females.

1.11.5.1.3. Interpersonal environments and eating disorders in the general population.

Interpersonal environments that place an emphasis on weight and shape have been implicated in the development of eating disorders. There is some evidence to suggest that athletic domain is one such environment (e.g., Jacobi, Hayward et al., 2004). Other such environments include the familial environment where relatives of eating disordered patients also have the disorder (e.g., Lilenfeld et al., 1998; Stein et al., 1999; Strober & Humphrey, 1987; Strober, Lampert, Morrell, Burroughs, & Jacobs, 1990). For example, Strober et al. (2000) reported that the age-specific risk for AN in female relatives, of AN women, was 11.4 times as high as the risk in female relatives of healthy controls, and that the risk of BN was 3.7 times as high among female relatives of BN women as in female relatives of healthy controls. In addition, it was also reported that the age-corrected risk for BN was 3.5 times as high among female relatives of AN women as among female relatives of the healthy controls, whereas the risk for AN was 12.1 times as high among female relatives of BN women than the healthy comparison group.

Consistent with Lilenfeld et al. (1998), Strober et al. also found milder phenotypes of AN and BN evident in female relatives. Specifically, the authors reported that for female relatives of AN women, the age-corrected risk of partial AN was 5.2 times that for female relatives of the healthy controls, whereas the risk for partial BN in female relatives of BN women was 2.6 times that for female relatives of healthy controls. Similar results were found by Strober, Freeman, Lampert, Diamond, and Kaye (2001) in relation to men with AN. Specifically, Strober et al. (2001) reported that the risk for AN in female relatives of AN men was 20.3 times as high as the risk in female relatives of normal controls. When the milder phenotypic diagnosis was included as part of the AN spectrum, the overall relative risk fell by one half, but remained substantial; specifically, full and partial AN was 9.1 times more

frequent in female relatives of men with AN compared with female relatives of never-ill controls. However, there was no evidence of increased aggregation of BN in female relatives, suggesting an absence of cross-transmission in families of males with AN.

While it appears that the family transmission of eating disordered behaviours is more common amongst female relatives, the majority of research has been conducted within the context of the mother-child constellation (Elfhag & Linné, 2005). Pike and Rodin (1991) noted that mothers of eating disordered patients were more likely to have an eating disorder than control mothers and thought their daughters should lose more weight than mothers of girls who were not eating disordered. Agras, Hammer, and McNicholas, (1999) further noted that mothers who themselves have an eating disorder tend to have a negative influence on their children's attitudes and behaviours, feeding them irregularly, using food for non-nutritive purposes, and expressing concern about their daughters' weight as early as the age of two, leaving them vulnerable for the later development of eating disorders. Correspondingly, these findings have also been replicated within the community samples (e.g., Anschutz, Kanters, Van Strien, Vermulst, & Engels, 2009; Wertheim, Martin, Prior, Sanson, & Smart, 2002). For example, Yanez, Peix, Atserias, Arnau and Brug (2007) found that adolescent girls whose mothers and fathers have abnormal eating attitudes were almost three times and twice as more likely, respectively, to have abnormal eating attitudes themselves.

1.11.5.1.3. Adverse life events and eating disorders in the general population.

Stressful life events have long been considered potential precipitating factors of eating disorders (e.g., Bachar, Stein, Canetti, & Gur, 2008; Johnson, Cohen, Kasen et al., 2002; Schmidt, Tiller, Blanchard, Andrews, & Treasure, 1997; Schmidt, Troop, & Treasure, 1999). Correspondingly, Fairburn and colleagues (see Fairburn, Cooper, et al., 1999, Fairburn et al., 1997, 1998; Welch, Doll, & Fairburn; 1997) stated that eating disordered patients reported more stressful life events than matched controls. For instance, Welch et al. found that a higher frequency of stressful events was reported by BN women than healthy controls. In particular, BN women reported experiencing events which involved general disruption (a significant house move; a change in family structure) or events that involved a threat to the subject's sense of bodily integrity and safety (a significant episode of physical illness; pregnancy; sexual abuse and physical abuse) in the year before the onset of their eating disorder. In addition, Welch et al. further noted a linear trend between number of life events

and case status, such that the greater the number of adverse events reported, the greater the likelihood of a subject being a BN case. However, life events involving a loss or threatened loss (bereavement; illness of a close relative, friend or partner; and the end of a relationship with a boyfriend or partner) were not significantly associated with BN.

Childhood abuse is another factor that has been consistently identified to precede the onset of eating disorders from the aforementioned studies, and accordingly this link has been consistently supported (e.g., Hastings & Kern, 1994; Steiger et al., 2010; Waller, 1992; Welch & Fairburn, 1994). For example, Vize and Cooper (1995) reported both AN, and BN patients reported higher rates of sexual abuse (42.9% and 27.1%) than the healthy control group (6.7%). Likewise, Rorty, Yager, and Rossotto (1994) stated that BN women reported higher rates of emotional abuse than the healthy control group. In relation to physical abuse, studies have reported that between 3% and 60.8% of eating disordered women report experiences of childhood physical abuse (e.g., Brown, Russell, Thornton, & Dunn, 1997; Fullerton, Wonderlich, & Gosnell, 1995; Léonard, Steiger, & Kao, 2003; Rorty, Yager, & Rossotto, 1995; Schmidt et al., 1993). While, these findings collectively suggest that childhood abuse (whether it is sexual, physical or emotional) is more prevalent amongst eating disordered individuals than non-eating disordered groups, Kent et al. (1999) found that the central predictor of disturbed eating attitudes (once covariance between the forms of trauma had been taken into account) was emotional abuse. Subsequently, Kent et al. concluded that the other forms of abuse may only appear to have an effect as a result of their strong correlations with emotional abuse.

1.11.5.2. Interpersonal difficulties and eating disorders in the athletic population.

The athletic sector has yet to make a mark on generating such findings evident in the general population. Nonetheless there is a small, yet growing, body of research, alongside anecdotal evidence implicating interpersonal factors such as the parent-athlete relationship (e.g., Hinton & Kubas, 2005), coach-athlete relationship and coach interpersonal behaviours (e.g., Jones et al., 2005; Muscat & Long, 2008; Rosen & Hough, 1988; Sundgot-Borgen, 1994) as well as the teammate-athlete relationship (e.g., Chopak & Taylor-Nicholson, 1991; Hausenblas & Carron, 2000; Rosen et al., 1986; Thompson & Sherman, 1999b; Williamson et al., 1995) and adverse life events (Sundgot-Borgen, 1994; Sundgot-Borgen, Fasting, Brackenridge, Torstveit, & Berglund, 2003) in eating disorders. For example, Sundgot-

Borgen et al. found that 66% of eating disordered athletes reported experiencing some form of sexual harassment and abuse.

Research examining the role of the coach-athlete relationship has consensually demonstrated that a relationship characterised by conflict, power struggles, and the need for approval (Jones et al., 2005), a coach that employs an autocratic coaching style (Biesecker & Martz, 1999), as well as a coach who implements the continuous monitoring and teasing of weight and eating practices (see Heffener et al., 2003; Kerr et al., 2006; Muscat & Long, 2008) inadvertently exacerbate the risk of eating disorders amongst athletes. On the other hand, research examining the influence of teammates on athletes' eating and dieting behaviours is limited and has produced somewhat mixed results, with some authors portraying teammates to exert a negative effect on an athlete's eating behaviours via perceived social pressure (Williamson et al., 1995) and encouragement to engage in pathogenic weight control methods (Rosen et al., 1986), while others have found teammate influences to be more constructive and positive via the encouragement to consume more and a variety of healthy food (Hausenblas & Carron, 2000). Only one study to date has simultaneously examined the association between the quality of multiple interpersonal relationships (coaches, parents, sport friends/peers) on disturbed eating attitudes amongst athletes (Scoffier, Maïano, & d'Arripe-Longueville, 2010). Scoffier et al. found that the quality of the parent-athlete relationship and peer acceptance was directly related to athletes' disturbed eating attitudes, while the quality of coach-athlete relationship, and of sport friendship, positively and significantly influenced disturbed eating attitudes through perceived physical ability. This indicates that both the coach-athlete and teammate-athlete relationship affects athletes' eating attitudes via a more contextualised, sport-specific route, by undermining athletes' belief in their physical ability, while the capacity in which parental relationships affect athletes' eating attitudes and behaviours, may be more general and context-free.

1.11.5.3. Brief summary of the literature on interpersonal difficulties and eating disorders.

In summary, there is evidence to suggest that interpersonal difficulties are associated with eating disorders and eating disordered symptoms within the general population. Specifically, it appears that dysfunctional relationships with parents, close others, and romantic partners, insecure attachment styles, high levels of social anxiety and loneliness, as

well as incidents of adverse life events are closely linked to eating disorders. However, due to the nature of these studies (i.e., cross sectional), it is not clear whether interpersonal difficulties precede the onset of eating disorders or are merely a symptom of the disorder (see Jacobi, Hayward et al., 2004; Lacey & Price, 2004). Moreover, the support for these cross-sectional patterns is far from convincing when examined in prospective studies (partly due to the limited number of studies available). As such, little concrete evidence is said to exist to support the status of interpersonal difficulties related to family functioning (despite family dynamics being postulated as a putative risk factor since the earliest conceptualisation of the disorder), attachment styles, and adverse life events as risk factors (see Jacobi, Hayward et al., 2004), and has thus been rendered a correlate of psychopathology in general (Erol, Yazici, & Toprak, 2007). This is on the basis that studies have often relied on patients' reports of family functioning, used small clinical sample sizes, and the fact that family dysfunction and insecure attachment styles are also evident in other psychiatric conditions such as anxiety (e.g., Woodside, Swinson, Kuch, & Heinmaa, 1996), depression (e.g., Wade et al., 2007) and OCD (e.g., Erol et al., 2007), and therefore may not be specific to eating disorders. Thus, further prospective studies are needed to understand the role of interpersonal difficulties in eating disorders (Jacobi, Hayward et al., 2004). Within the athletic setting, on the other hand, there is some evidence supporting interpersonal difficulties and eating disorders with only a handful of studies examining such associations. However, of the studies that have explored such associations (e.g., Scoffier et al., 2010; Sundgot-Borgen et al., 2003), they generally support the notion that interpersonal difficulties are related to problematic eating attitudes and behaviours. There are currently no prospective studies available examining the link between interpersonal difficulties and eating disorders.

1.12. Evidence Supporting the Utility of the Transdiagnostic Cognitive Behavioural Theory of Eating Disorders

While the aforementioned studies appear to support the association between the various psychopathological processes within the transdiagnostic cognitive behavioural theory, support for the theory as a whole is also evident (e.g., Byrne, Fursland, Allen, & Watson, 2011; Fairburn et al., 2009; Wade, Bergin, Martin, Gillespie, & Fairburn, 2006). Specifically, Wade et al. reported a strong pattern of increased impaired functioning as the number of eating disordered behaviours increased. In particular, in comparison to women

reporting fewer than three eating disordered behaviours, women with three or more eating disordered behaviours reported lower levels of self-esteem and higher levels of impulsivity, perfectionism (high personal standards and self-evaluative), neuroticism, depression and novelty seeking. Similar patterns were also noted in relation to interpersonal functioning, with the recall of a dysfunctional parental relationship characterised by parental conflict, comments about weight, parental expectations, parental criticism, and low maternal and paternal care in the first 16 years of life associated with increased eating disordered behaviours. Furthermore, Byrne et al. reported that treatment stemming from the transdiagnostic theory (i.e., Enhanced Cognitive Behavioural Treatment; CBT-E) resulted in significant improvements in both eating and more general psychopathology. Specifically, substantial improvement was reported in relation to levels of mood (depression, anxiety) interpersonal difficulties, self-esteem and quality of life, for both completers and the intent-to-treat sample. In particular, patients reported a significant decline in interpersonal difficulties, levels of depression, perfectionism, anxiety and stress, and increases in self-esteem and quality of life. However, the authors noted that there was no change in mood intolerance amongst patients. Specifically, the authors noted that patients scoring high on the Distress Tolerance Scale (Corstorphine et al., 2007) pre-treatment did not show improvement on this measure over treatment. Consequently, Byrne et al. concluded that this lack of improvement in relation to mood intolerance could be related to the measure of mood intolerance being less than adequate or that the mood intolerance treatment module in CBT-E was not potent enough to fully address this complex construct.

The aforementioned findings collectively provide substantial support for the theoretical and conceptual underpinnings of the transdiagnostic cognitive behavioural theory of eating disorders. However, there are some limitations related to the underlying mechanisms of the theory. These will be discussed in the following section.

1.13. Limitations of the Transdiagnostic Cognitive Behavioural Theory of Eating Disorders

The first concern regarding the theory relates to the grouping of the three ‘distinct’ eating disorders under one classification (e.g., Birmingham, Touyz, & Harbottle, 2009; First et al., 2004; Schmidt & Treasure, 2006), as some experts are opposed to the idea. First et al. believe that the adoption of the transdiagnostic theory would not only change the diagnostic

criteria, but would further result in a change in the specificity, and sensitivity of future diagnosis. Birmingham et al. further added that the acceptance of such a theory would not only bring changes to current prevalence rates, treatment responses, and outcomes, but would also considerably reduce the morbidity and mortality rate of AN, if BN and EDNOS were to be classified with AN. This in turn could deemphasise the seriousness of AN, and consequently reduce the funding available for treatment. On the other hand, many authors welcome the transdiagnostic approach to the classification of eating disorders (e.g., Waller, 2008).

The second concern regards the definition and measurement of clinical perfectionism. As previously mentioned, Shafran et al. (2002) viewed clinical perfectionism as a one-dimensional construct, involving both the determined pursuit of self-imposed standards, and extremely vulnerable self-evaluation. However, this definition has been seen as contentious and has been the topic of much debate amongst other perfectionism experts (see Dunkley, Blankstein, Masheb, & Grilo, 2006; Hewitt, Flett, Besser, Sherry, & McGee, 2003 for a more comprehensive review) who viewed Shafran et al.'s proposition as contradictory. First, Hewitt et al. strongly argued against the conceptualisation of clinical perfectionism as it primarily favours a return to a unidimensional approach to the study of perfectionism prior to the 1990s. The authors believed that undertaking a unidimensional approach would result in an under-appreciation of the role of perfectionism in a variety of disorders and distress. Secondly, Hewitt et al. claimed that Shafran et al. (2002) have incorrectly captured the core psychopathology of clinical perfectionism, by only focusing on the self-orientated and self-imposed perfectionism and minimising the importance of interpersonal processes involved in perfectionism (e.g., involvement of others), as well as only pursuing personally demanding standards in one domain. Specifically, Hewitt et al. argued that people with perfectionism are trying to perfect the self and they therefore pursue personally demanding standards in multiple domains, not just in one particular domain. Furthermore, Hewitt et al. argued that Shafran et al.'s unidimensional approach with the central focus on the self-orientated perfectionism was not supported by empirical evidence, and that both interpersonal related components and self-related components are equally important in understanding perfectionism in eating disorders (e.g., Hewitt, Flett, & Ediger, 1995; McLaren et al., 2001; Soares et al., 2009). Moreover, Hewitt et al. (2003) suggested that the treatment derived from this theory would be 'directed more toward temporary relief than a treatment model oriented

around lasting change' (p. 1232). Instead, the authors suggest that for treatment to yield lasting change, interpersonal aspects of perfectionism need to be incorporated by including a 'schema-focused phase' in which 'enduring, depth-level schemas based on interpersonal patterns, developmental origins, and traumatic experiences' are addressed (p. 1232).

Dunkley, Blankstein et al. (2006), on the other hand, suggested that clinical perfectionism is better viewed as tapping two distinct, but related dimensions, namely personal standards and self-critical evaluation concerns, as opposed to one. Grounded in previous factor analytic studies on the multidimensional perfectionism scales, Dunkley, Blankstein et al. argued that findings from such studies yield two higher order factors; personal standards perfectionism reflected in the setting of high standards and goals for oneself, and self-critical evaluation perfectionism reflected in the overly critical evaluations of one's own behaviours and inability to derive satisfaction from successful performance and chronic concerns about others' criticism and expectations.

Dunkley, Blankstein et al. also questioned the manner in which clinical perfectionism was psychometrically measured. Shafran et al. (2002) have maintained that the self-orientated perfectionism subscale from HMPS (Hewitt & Flett, 1991) and the personal standard subscale from the FMPS (Frost, Marten, Lahart, & Rosenblate, 1990) as the '*closest to the clinical concept of perfectionism*' (pp.777). Shafran et al. dismissed the self-evaluative indicators of perfectionism (e.g., FMPS' concerns over mistake, doubts about action and HMPS' socially prescribed perfectionism), proposing that these constructs 'do not assess perfectionism per se, but assess related constructs' (pp. 776). However, Dunkley, Blankstein et al. argue that the advocated measures only assess one component of clinical perfectionism, namely 'the determined pursuit of personally demanding, self-imposed standards' (pp. 778) and not the critical pathological component of clinical perfectionism. Dunkley, Blankstein et al. concluded that such maladaptive aspects of clinical perfectionism are better reflected by the self-evaluative measures than by the self-imposed high personal standards subscales of the HMPS and FMPS. In line with this argument, recent research has revealed that self-evaluative/ self-critical items are a better and more robust predictor of eating disordered behaviours than the advocated measures of Shafran et al. (e.g., Bulik et al., 2003; Dunkley, Blankstein et al. 2006; Dunkley & Grilo, 2007; Fenning et al., 2008). For instance Dunkley, Blankstein et al. found self-criticism to be related to over-evaluation of shape and weight in BED patients. Moreover, after controlling for self-critical perfectionism, other perfectionism

components such as high self imposed personal standards were not uniquely related to over-evaluation of shape and weight. Similarly, Bulik et al reported that the self-evaluative components of perfectionism as captured by concern with mistakes was predictive of both AN, and BN when compared to psychiatric disorders.

However, in response to Hewitt et al. (2003), Shafran, Cooper, and Fairburn (2003) argued that their conceptualisation of clinical perfectionism was made from a clinical perspective, where theories and treatments had not focused on other-oriented factors. Moreover, while Hewitt et al. suggested that employing a uni-dimensional approach to perfectionism would result in an inappropriate understanding of the role of perfectionism in psychopathology, Shafran et al. claimed "...a focus on the specific [self-oriented] mechanisms maintaining clinical perfectionism is more likely to permit psychopathology to be successfully treated" (p. 1218). In addition, Egan et al. (2011) have noted that such criticisms by Dunkley, Blankstein et al. (2006) were based on the idea that Shafran et al. (2002) claimed that personal standards were maladaptive. Egan et al. argued that this is not the case, rather the underlying notion of clinical perfectionism was that there was nothing maladaptive in striving for excellence in itself, instead it is when someone bases their sense of self-worth almost exclusively on striving for standards, and concern over mistakes in meeting these standards, that perfectionism becomes a "clinical" problem. Thus, Egan et al. concluded that findings in the literature supporting two main areas of perfectionism involving personal standards and maladaptive evaluative concerns are actually in line with the concept of clinical perfectionism, where the emphasis is on the maladaptive nature of basing self-evaluation on striving, and concern over mistakes in such pursuit.

The final limitation of the transdiagnostic theory, relates to the conceptualisation of interpersonal difficulties. Although Fairburn et al. (2003) provided brief examples of how family dynamics, long-term interpersonal difficulties, specific weight-orientated environments, and adverse interpersonal events can all impact eating psychopathology, very little detail is given as to which of these aspects of interpersonal difficulties are important, and how they conspire to maintain the disorder (Schmidt & Treasure, 2006). Moreover, as the theory is also believed to be relevant to the onset of the disorder, the same limitation can be related to the onset of the disorder, in that it is unclear which of the aspects of interpersonal difficulties are important, and how they conspire to illicit the disorder. Furthermore, there is a lack of clarity about the problems/indices that encompass long-term

interpersonal difficulties. Rather it is left to the interpretation of the reader to understand what constitutes long-term interpersonal difficulties. Moreover, the theory appears to only focus on the relationship dynamics within the family. As highlighted in the interpersonal difficulties section of this Chapter, dysfunctional relationship dynamics with close others, romantic partners, and siblings have been found to be related to increased eating disordered symptoms (e.g., Boyes et al., 2007; Gerner & Wilson, 2005; Lehoux & Howe, 2007). Moreover, Stice et al. (2002) reported that lack of social support from peers was predictive of the onset of binge eating, rather than lack of social support from parents.

1.14. Moving Beyond the Current Research in Eating Disorders amongst Athletes: Rationale for Thesis

This chapter has discussed the prevalence and potential risk factors of eating disorders both in the general and athletic population. Specifically, in comparison to the general population, the prevalence of eating disorders appears to be higher in the athletic population (e.g., Sundgot-Borgen & Torstveit, 2004). However, due to the variation in terminology, methodology, and samples used, the currently published prevalence rates of eating disorders are contradictory, elusive, and poorly established. Thus, there remains a significant need for further research, especially in the context of British sport. In particular, Hausenblas and Carron (1999) noted in their meta-analysis that only two studies (out of 80) were conducted employing British athletes. Although in the past decade there has been a surge in the number of British studies published (e.g., Hulley et al., 2007; Hulley & Hill, 2001; Nordin et al., 2003), these studies nevertheless share the aforementioned extensive methodological flaws associated with classification, measurement, and sampling issues (see Section 1.5). Therefore, the first objective of this thesis (Study 1) was to examine the prevalence of potential cases of eating disorders within the British athletic population, by building on the shortcomings of the current sport-specific prevalence literature (i.e., narrow focus on one performance level, narrow focus on female athletes, lack of a control group of non-athletes for comparison), and following the guidelines outlined by Petrie and Greenleaf (2007) (see section 1.6). Moreover, given that questions have been raised about the classification of eating disorders into AN, BN, and EDNOS (see Table 1.3), Fairburn et al.'s (2003) transdiagnostic approach was applied in this thesis, where AN, BN and EDNOS were treated as one unitary category termed 'eating disorders'. Thus, this thesis examined the prevalence of potential cases of eating disorders *between* and *within* elite, developmental, and

recreational athletes, as well as a control group of non-athletes. In addition, gender and sport type differences were also examined *between* and *within* the aforementioned performance standards. Exploration of such differences *between* and *within* performance standards are imperative, as it would not only provide a clearer picture of the prevalence of eating disorders amongst athletes across all competitive standards, but also by determining the specific subgroup of athletes at an increased risk, these groups can be targeted with specifically tailored education programmes and interventions aimed at prevention. A more detailed outline of the aims of Study 1 is presented in section 1.15.

Despite the great progress made in the understanding of potential risk factors for eating disorders amongst the athletic population since the 1980s, the focus and scope of such research is limited, with sport-specific risk factors as the main focal point. As such, there is a significant need to extend beyond the current limited and heavily contextualised knowledge-base, and investigate other potential risk factors and correlates of eating disorders, ones that are grounded in, and supported by theory and research. Doing so will develop a more systematic and holistic understanding of the risk factors of eating disorders amongst athletes, as well as serve to facilitate the development of appropriate treatments and interventions. Accordingly, Fairburn et al. (2003) proposed an evidence based theory relevant to both the development and maintenance of eating disorders (see Figure 1.1). Therefore, the latter studies of this thesis focused on testing and making advancements to Fairburn et al.'s theory, by addressing the noted limitations of the theory (see section 1.13). More specifically, expanding our understanding of the content of 'interpersonal difficulties', and its association to disturbed eating attitudes, the content of 'clinical perfectionism', as well as expanding our understanding of the interrelationships amongst the constructs underlying the theory, within the British athletic population. This research therefore makes a significant contribution to filling the gaps in the current eating disorder literature amongst athletes, as well as addressing the noted limitations underlining Fairburn et al.'s theoretical framework. These will now be detailed in the following paragraphs.

Shafran et al. (2002) stated that the self-orientated perfectionism subscale from HMPS (Hewitt & Flett, 1991) and the personal standard subscale from FMPS (Frost et al., 1990) are the '*closest to the clinical concept of perfectionism*' (p.777). However, recent research has revealed that self-critical evaluative items are a better predictor of eating disordered behaviours than personal standards (e.g., Dunkley, Blankstein et al., 2006; Dunkley & Grilo,

2007). Therefore, this thesis conceptualised and measured clinical perfectionism in terms of high personal standards *and* self-critical perfectionism. In that way, the relative importance of both high personal standards *and* self-critical evaluations to eating disorders can be understood. Moreover, the findings generated would also highlight whether clinical perfectionism is better reflected by self-critical or self-oriented perfectionism measures.

Fairburn et al. (2003) described four examples in which interpersonal difficulties manifest themselves: (a) *family interpersonal dynamics*, (b) *long-term interpersonal difficulties*, (c) *interpersonal environments* and (d) *adverse interpersonal events*. This thesis focused on the two former examples of interpersonal difficulties (i.e., family interpersonal dynamics and long-term interpersonal difficulties). However, as previously noted, the current conceptual delineation and operationalisation of these two examples of interpersonal difficulties are limited and unclear. For instance, Fairburn et al. only focused on the relationship dynamics within the family, however, it has been suggested there is nothing more important in determining the wellbeing and optimal functioning of individuals than multiple close relationships (Sullivan, 1953). Accordingly, there is empirical evidence within the general population to suggest that dysfunctional relationship dynamics with significant others (i.e., friends, romantic partners, and siblings) are related to increased eating disordered symptoms (e.g., Boyes et al., 2007; Gerner & Wilson, 2005; Lehoux & Howe, 2007).

Correspondingly, the athletic community is a social environment providing frequent and varied opportunities for social interactions with others (Jowett, 2007). In particular, athletes lie at the heart of this environment which is composed of several overlapping and multifaceted agents such as coaches, teammates, parents, support staff, and officials (see Côté, 1999; Jowett & Cockerill, 2002). Although over the course of their sporting career athletes can form many significant and interdependent relationships, traditionally within the sporting domain, often the attention is paid to the relationship developed and maintained between the coach and the athlete (Jowett, 2007). The quality of a coach-athlete relationship has been conceptualised as a situation in which coaches' and athletes' feelings, thoughts, and behaviours are mutually and causally inter-connected (Jowett, 2003). Accordingly, the quality of the coach-athlete relationship has been associated with a number of both positive and negative outcomes related to both performance and wellbeing (e.g., Durand-Bush & Salmela, 2002; Gould, Greenleaf, Chung, & Guinan, 2002). Moreover, recent research has demonstrated the instrumental role that the quality of other significant relations such as the parent and fellow teammates can exert (independently and collectively) in shaping athletes'

eating attitudes (e.g., Scoffier et al., 2010), athletic experiences and development (e.g., Côté, 1999; Holt, Tamminen, Black, Sehn, & Wall, 2008; Jowett & Timson-Katchis, 2005; Smith, 2007; Ullrich-French & Smith, 2006; Wuerth, Lee, & Alfermann, 2004) and wellbeing (e.g., Gould, Tuffey, Udry, & Loehr, 1996; Gould, Udry, Tuffey, & Loehr, 1996; Jowett & Cramer, 2010). Therefore, for the purpose of this thesis, the description *family interpersonal dynamics* was extended to capture *state-like/situational interpersonal difficulties*, more specifically, how an individual currently perceives their relationship with significant others. Accordingly, for this thesis, the quality of the relationship between athletes and parents, coaches, and teammates were examined.

There is also an absence of a clear definition of what constitutes *long-term interpersonal difficulties* in the transdiagnostic theory. Accordingly, several authors have noted pronounced enduring, internal, interpersonal difficulties related to social functioning and social isolation amongst patients with eating disorders (e.g., Cooper et al., 2004; McIntosh et al., 2000), with eating disordered patients demonstrating high levels of social anxiety, viewing themselves as socially incapable in comparison to others, and feeling socially withdrawn/isolated. Therefore, for the purpose of this thesis, the description of *long-term interpersonal difficulties* was extended to capture *trait-like/dispositional interpersonal difficulties*. More specifically, dispositional interpersonal difficulties reflect enduring, internal characteristics that undermines individuals' social functioning (i.e., behaviours), and sense of self (i.e., cognitions). Thus in this thesis, three key dispositional indices were identified, and investigated: attachment styles, social anxiety, and trait loneliness.

In addition to furthering our understanding of the content of interpersonal difficulties, this thesis also sought to examine the pathway between interpersonal difficulties and eating disordered symptomatology. In particular, a number of studies have highlighted that the specific mechanisms by which interpersonal difficulties influence eating disorders are lacking (e.g., Jones et al., 2006; O'Kearney, 1996), instead studies have primarily examined a direct pathway between interpersonal difficulties and eating disorders. Therefore, using the now extended descriptions of interpersonal difficulties (i.e., situational and dispositional) and guided by the other psychopathological processes evident the transdiagnostic theory, this thesis examined the association between interpersonal difficulties and the core psychopathology underlying clinical eating disorders (termed eating psychopathology hereafter in this thesis), via the mediating processes of clinical perfectionism (measured by both personal standards and self-critical instruments), self-esteem and depression.

Schmidt and Treasure (2006) further noted that very little detail is given by Fairburn et al. (2003) as to which aspects of interpersonal difficulties are important in eating disorders. Furthermore, Jacobi, Hayward et al. (2004) proposed the need for more prospective studies in order to understand the role of interpersonal problems in eating disorders as, from current research, it is unclear whether interpersonal difficulties precede the onset of eating disorders or are a consequence of the disorder. Therefore, this thesis examined the prospective role of both situational and dispositional interpersonal difficulties on athletes' eating psychopathology. Moreover, as a number of previous studies have not accounted for the initial eating disorder attitudes in their prospective analyses (e.g., Calam & Waller, 1998), this thesis examined the contribution of both situational and dispositional interpersonal difficulties in athletes' eating psychopathology, over and beyond their initial eating psychopathology.

Finally, the transdiagnostic cognitive-behavioural theory of eating disorders (Fairburn et al., 2003) provides a grounded conceptual framework to understand how eating disorders may arise. While there is evidence to support the associations among its main components within the general population, there is an observable gap in the scientific understanding of such processes within the athletic population, as well as paucity in the understanding of the concomitant interrelationships among the processes involved. Therefore, this thesis also tested the constructs underlying the transdiagnostic cognitive behavioural theory, to further understand the mechanisms involved in athletes' eating psychopathology. Specifically, guided by this theory and relevant empirical research (e.g., Collins & Read, 1990; Dunkley & Grilo, 2007; Leveridge et al., 2005), this thesis tested a model that proposed linkages between interpersonal difficulties, clinical perfectionism, self-esteem, depression, and eating psychopathology (see Figure 1.2).

In the absence of detailed information related to which aspects of interpersonal difficulties are potentially more influential and/or how they may interact to maintain (and illicit) the disorder (see Schmidt & Treasure, 2006), the extended description of situational and dispositional interpersonal difficulties was used. In relation to situational interpersonal difficulties, this conceptualisation was extended to capture not only athletes' relationship quality (or lack thereof) with their parents, but also their relationship quality (or lack thereof) with their coach. The reason for this is that within the sport domain, the most significant interpersonal relationship developed is between a coach and the athlete (e.g., Burke, 2001),

and consequently, the relationship this has yielded the most empirical attention. It is said that both performance enhancement and psychological wellbeing lie at the heart of the relationship (Jowett & Poczwardowski, 2007), with the coach often fulfilling the role of a parental figure in the life of athletes (Gervis & Dunn, 2004). In relation to dispositional interpersonal difficulties, it was measured in terms of an individual's attachment style. Accordingly, these early yet enduring attachment styles have been documented to lay the foundation in determining an individual's relationship quality with close friends, co-workers, and romantic partners (see Altin & Terzi, 2010; Bowlby, 1988; Hazan & Shaver, 1994; Mikulincer & Shaver, 2007). Collectively, research findings have indicated that while secure attachment is positively associated with high quality, healthy functioning relationships, insecure attachment is often associated with poor quality relationships, with insecurely attached individuals reporting increased conflict, less support, and less overall satisfaction in their close relationships (e.g., Campbell, Simpson, Boldry, & Kashy, 2005; Collins & Read, 1990; Leveridge, Stoltenberg, & Beesley, 2005). Likewise, limited research in sport has also highlighted that athletes' insecure attachment styles are negatively associated with perceived relationship satisfaction with the coach (Davis & Jowett, 2010), while a secure attachment style corresponds to more positive sporting friendships (Carr, 2009). Therefore, the aforementioned connection found between attachment styles and relationship quality was used to capture the notion of interpersonal difficulties within the tested transdiagnostic cognitive behavioural model.

1.15. Broad Thesis Aims

The broad aims for all the studies presented in this thesis are presented below. For more specific details, please see the relevant chapters.

1.15.1. Study 1 (see Chapter 3)

- To identify the levels of eating disordered psychopathology and engagement in key eating disordered behaviours amongst a sample of British elite, developmental, recreational athletes, and a control group of non-athletes.
- To identify the prevalence of potential cases of eating disorders amongst a sample of British elite, developmental, recreational athletes, and a control group of non-athletes.

- To explore gender and sport type differences in the eating disordered psychopathology scores, engagement in key eating disordered behaviours and prevalence of potential cases of eating disorders *between* and *within* a sample of British elite, developmental, recreational, and non-athletes.

1.15.2. Study 2 (see Chapter 4 and 5)

- To examine the association between situational interpersonal difficulties (i.e., relationship quality with parents, coaches, and teammates), and dispositional interpersonal difficulties (i.e., attachment styles) and athletes' eating psychopathology.
- To explore the mediating role of clinical perfectionism, self-esteem, and depression in such associations.

1.15.3. Study 3 (see Chapter 6)

- To examine the association between situational interpersonal difficulties (i.e., relationship quality with mother, father, and coaches) and dispositional interpersonal difficulties (i.e., social anxiety and loneliness) and eating psychopathology amongst British athletes and non-athletes.
- To explore the mediating role of clinical perfectionism, self-esteem, and depression in such associations.
- To examine whether situational or dispositional interpersonal difficulties is more predictive of athletes' and non-athletes' eating psychopathology.

1.15.4. Study 4 (see Chapter 7)

- To examine the prospective role of situational interpersonal difficulties (i.e., relationship quality with parents, coaches, and teammates), and dispositional interpersonal difficulties (i.e., attachment styles) on athletes' eating psychopathology.

1.15.5. Study 5 (see Chapter 8)

- To test the applicability of components related to the transdiagnostic cognitive-behavioural theory of eating disorders within an athletic population.
- To explore the applicability of the tested model across gender, sport type, and performance standard.

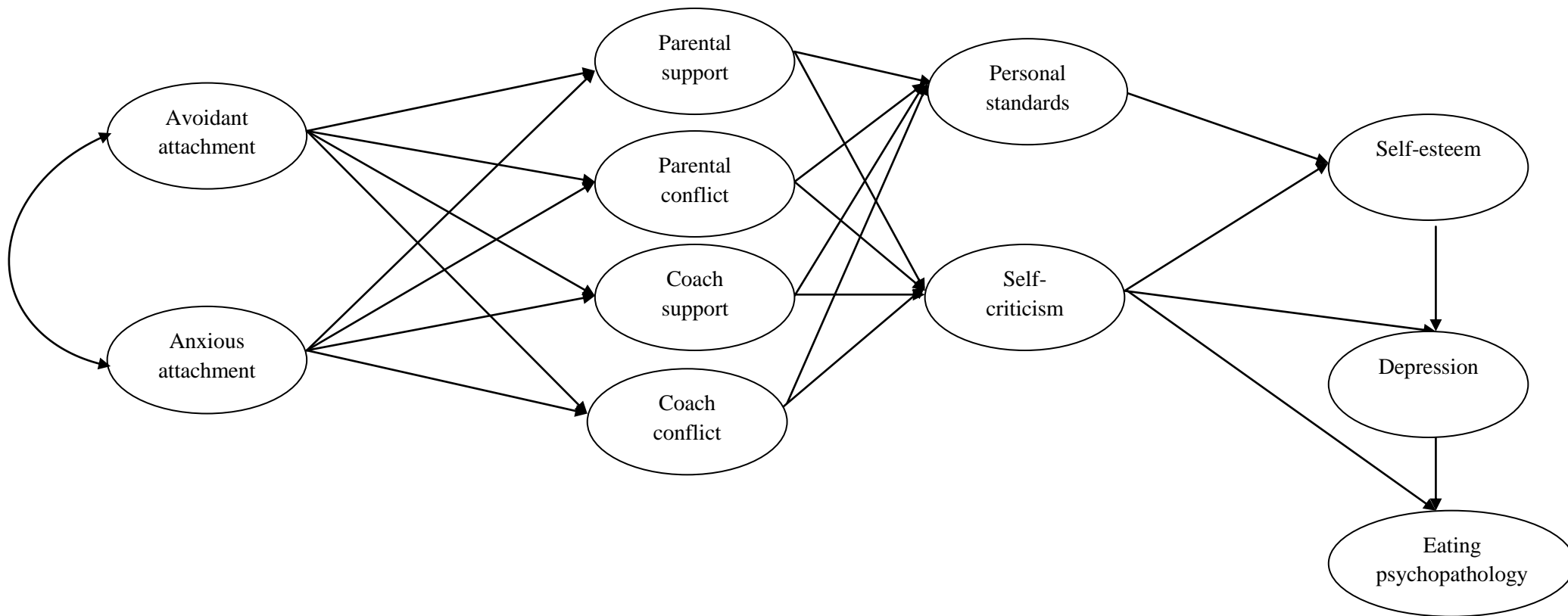


Figure 1.2. The hypothesised transdiagnostic cognitive-behavioural model of athletes' eating psychopathology.

METHODOLOGY

2

Methodology

This chapter outlines the methodology utilised in this thesis. First, this chapter conveys the study design, participant characteristics and size, as well as the strategies employed to recruit potential participants. Next, the chapter describes the psychometric measures and the range of inferential statistical analyses employed in the current programme of study.

2.1. Design

Cross-sectional studies have been highlighted as an important and useful first step for identifying potential factors that may be connected to psychopathology as well as eliminating certain factors from consideration (e.g., Jacobi, Hayward et al., 2004; Kazdin et al., 1997). Therefore, for Studies 2, 3 and 5, where the main aim was to examine the potential psychosocial correlates of eating psychopathology amongst athletes (and non-athletes) a *cross-sectional* design was employed.

Only when a correlate is demonstrated to precede the outcome can it acquire the status of a risk factor (Jacobi, Hayward et al., 2004). This status can only be established when the antecedent and outcome are evaluated prospectively and longitudinally (Kazdin et al., 1997). Therefore, for Study 4, which seeks to examine the antecedent role of interpersonal difficulties on athletes' eating psychopathology, a *prospective, longitudinal* design which included assessments of variables at two different time points was employed.

2.2. Participants

Research has consistently demonstrated that eating disorders occur during adolescence and early adulthood (e.g., Jacobi, Hayward et al., 2004; Striegel-Moore & Bulik, 2007; Woodside & Garfinkel, 1992). Specifically, the documented age for the development of AN is around 15 to 19 years of age (e.g., Halmi, Casper, Eckert, Goldberg, & Davis, 1979; Nevenon & Broberg, 2000), and for BN around 19 years of age (e.g., Hudson et al., 2007), although cases of presentation are evident in prepubertal children (e.g., Bryant-Waugh, Cooper, Taylor, & Lask, 1996) and later in life (e.g., Beck, Casper, & Andersen, 1996).

However, within the athletic domain there is no such data available, although excessive weight concerns have been documented in girls aged 5 to 7 participating in aesthetic sports (Davison, Earnest, & Birch, 2002). Moreover, some authors argue that eating disorders are more common at the collegiate and elite level (e.g., Hausenblas & Carron, 1999; Smolak et al., 2000; Sundgot-Borgen, 1994), which is said to occur around the ages of 18-30 (Wylleman, De Knop, Verdet, & Cecič-Erpič, 2007; Wylleman & Lavallee, 2004). However, for certain sports (e.g., gymnastics) athletes may already be nearing the end of their career by the age of 18. Therefore, for the purpose of the current research programme, athletes aged 16 and over (except Study 3) were recruited. When non-athletic controls were used for comparison, a convenience sample of non-athletes aged 18 years and over was recruited.

2.2.1. Inclusion and Exclusion Criteria

In order to participate in this research programme, participants were required to fulfil the following criteria.

For athletes:

- British nationality
- Aged 16-45 (apart from Study 3 which was 18-40)
- Current participation in sport
- Not receiving treatment for any medical or mental illness (including eating disorders)
- Not participating in more than one sport type category (only applicable for Study 1)
- Not pregnant (only females)
- Relationship duration with their coach and teammates for a minimum of 3 months (only for Studies 2, 4, 5: this was reduced to 1 month for Study 3).

If athletes failed to meet any of the above criteria they were subsequently excluded from this programme of research.

For non-athletes:

- British nationality
- Aged 18-40
- Not receiving treatment for any medical or mental illness (including eating disorders)

- Not participating in any organised sport
- Not pregnant (for females)

If non-athletes failed to meet any of the above criteria they were subsequently excluded from this programme of research.

2.2.2. Sample Size

The sample size for the current programme of study was calculated in the following manner:

2.2.2.1. Study 1.

To determine the sample size needed, Cohen’s (1992) guidelines were followed for detecting group differences. Specifically, the convention rule that the desired power be set at .80, alpha at .05 and a medium effect size ($\beta=.20$) were followed (see Table 2.1).

Table 2.1. N for Small, Medium and Large ES at Power = 80 for $\alpha = .01$ and $.05$

Test	Significance level					
	0.01			0.05		
	SM	MED	LG	SM	MED	LG
Mean Differences						
2 Groups	586	95	38	393	64	26
3 Groups	464	76	30	322	52	21
4 Groups	388	63	25	274	45	18
5 Groups	336	55	22	240	39	16
6 Groups	299	49	20	215	35	14

Using the planning table provided by Cohen for comparing group means *between* the performance standards (e.g., elite, developmental, recreational, and non-athlete, gender differences between performance standards), a sample of 45 participants per group was required. For comparing sport type differences (in terms of individual and team sports and sport classification) *between* the performance standards, a total of 52 participants were required. For assessing group differences in terms of gender and sport type (individual v team) *within* each performance level, 64 participants were needed, while a minimum of 35 athletes were required for assessing mean differences in terms of the sport classification system (i.e., 6 sport categories).

2.2.2.2. Study 2 and 3.

To determine the sample size needed, the rules of thumb for conducting regressions as provided by Tabachnick and Fidell, (2001) were followed. Specifically, the two rules of thumbs are:

$N \geq 50 + 8m$ for testing multiple correlations (where the m is the number of IVs)

$N \geq 104 + m$ for testing individual predictors (where the m is the number of IVs)

Therefore using this equation, a sample size of 112-114 athletes was required for Study 2 and 3 and a sample size of 98-110 non-athletes was required for Study 3. In addition, the required sample size to obtain a power of 0.80 for a medium mediation effect when using multiple mediators is between 71 and 78 (Fritz & MacKinnon, 2007).

2.2.2.3. Study 4.

The sample size of the longitudinal study within this thesis is 122; 20.75% of the original sample of 588 participants participated in the second stage of the study. However, employing the aforementioned rule of thumb for conducting regressions as provided by Tabachnick and Fidell, (2001), the current sample size was within the required range (112-114).

2.2.2.4. Study 5.

McQuitty (2004) suggested that it is important to determine the minimum sample size required in order to achieve a desired level of statistical power with a given structural equation model prior to data collection. However, in reality there is no real consensus on the recommended size of the sample, as sample size is often affected by the normality of the data, as well as the estimation method that is used (Hoe, 2008). Nevertheless, it has been proposed that 5-10 participants per every free parameter are acceptable (e.g., Bentler & Chou, 1987; Byrne, 2006; Kline, 2005). Moreover, Hoelter (1983) proposed that a 'critical sample size' of 200 is enough to provide sufficient statistical power for data analysis.

2.3. Recruitment Procedure

Several strategies were employed to recruit potential participants, including the following:

2.3.1. Athletic Samples

The athletic participants were recruited employing a variety of methods. First National Governing Bodies (NGB), and sport organisations (e.g., local clubs, university sport clubs) were contacted to discuss participation in the study. Once interest to participate was obtained, all athletes on their system were sent either an electronic questionnaire pack (containing the informed consent form and questionnaires) or a weblink to the online version of the questionnaire. Second, athletes were approached during training sessions with the permission of coaches. Third, athletes were approached during lectures across several universities within the UK including the School of Sport, Exercise, and Health Sciences at Loughborough University. Finally, athletes were recruited through the Research Participation Scheme at Loughborough University, whereby first year undergraduate students voluntarily participated in the research in exchange for course credits.

2.3.2. Non-Athletic Samples

The non-athletic participants were primarily recruited from the School of Sport, Exercise, and Health Sciences at Loughborough University, although some participants were also recruited from other universities within the UK. In particular, non-athletes were approached during lectures across these universities, or were emailed a weblink to the online version of the questionnaire by a university coordinator. Finally, a number of these participants were also recruited through the abovementioned Research Participation Scheme at Loughborough University.

2.4. General Procedure

Prior to consent and completion of the questionnaire, participants and interested parties were informed about the nature of the study and its aims. Next, they were explained the voluntary, confidential, and anonymous nature of the study. It was made aware that they had the right to withdraw from the study at any stage without penalty. A description of the general procedures used in this thesis is provided below.

Once interest to participate in the research was obtained from NGB, sport organisations, and universities, all participants were provided with a questionnaire pack containing an information sheet, consent form (both parental and personal), as well as the questionnaires employed for the study. Data collection was conducted in one of the following manner:

- Electronically, where participants were emailed the information sheet, consent forms, and questionnaire pack by their NGB, the sport club, the researcher, or by a designated university coordinator, or completed the questionnaire online on a secure web-link.
- The researcher administered the questionnaire during lectures at various universities across England.
- Athletes were administered the questionnaire before a training session and returned the completed questionnaire to the researcher the following week in a sealed envelope.

2.5. Self-Report Psychometric Measures

A broad range of psychometric instruments were employed in this thesis. A detailed description of the instruments employed is provided below. The chosen instruments were selected on the premise that they fulfilled the following three conditions; (a) the instrument is concise, (b) the instrument upholds sound psychometric properties and (c) the instrument has been validated for use within a community sample and preferably within an athletic sample.

2.5.1. Demographic Questionnaire

A self-developed demographic questionnaire was employed throughout all the studies. Specifically, this questionnaire assessed the participants' age, gender, ethnicity, as well as the nature and extent of their athletic involvement. In addition to this, the demographic questionnaire assessed the participants' weight and diet history (see Appendix 9-12).

2.5.2. Body Mass Index (BMI)

Body Mass Index (kg/m^2) was calculated for all participants using their self reported height and weight as obtained by the Eating Disorder Examination Questionnaire (EDEQ).

2.5.3. Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 1994, 2008)

The EDEQ is a comprehensive self-report version of the Eating Disorder Examination (EDE; Fairburn & Cooper 1993); a structured interview often used for diagnosing clinical cases of eating disorders. Although clinical interviews are considered the most effective method of making a diagnosis of eating disorders (e.g., Sundgot-Borgen, 1993), the employment of this questionnaire is considered to be more cost effective, as well as less time

consuming (Fairburn & Beglin, 1994). Specifically, the latest version EDEQ 6.0 (Fairburn & Beglin, 2007; see Appendix 13) assesses the core attitudinal and behavioural features (e.g., the core eating psychopathology) related to eating disorders retrospectively, using a time-frame of the past 28 days. The attitudinal features of the core eating psychopathology are measured through dietary restraint (5 items; *“Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?”*), eating concern (5 items; *“Over the past 28 days, how concerned have you been about other people seeing you eat? Do not count episodes of binge eating.”*), shape concern (8 items; *“Has your shape influenced how you think about (judge) yourself as a person?”*), and weight concern (5 items; *“How dissatisfied have you been with your weight?”*). Items are scored on a 7 point Likert scale, ranging from 0 to 6. Scores for each subscale is calculated by averaging the sum of scores, with higher scores indicating higher levels of pathological eating attitudes. Moreover, the EDEQ has the advantage of providing a global EDEQ score which is the composite mean of the four aforementioned subscales. Correspondingly, the key behavioural features of eating psychopathology are assessed through the self reported frequency of binge eating, Objective Binge Episodes (OBEs), self-induced vomiting, laxative use, and excessive exercise. However, the self-reported frequency of episodes does not contribute to either the subscale or global EDEQ score.

All four subscales of the EDEQ have been shown to correlate well with the EDE, with correlations ranging from 0.79 –0.81 (e.g., Black & Wilson, 1996; Fairburn & Beglin, 1994). All pathogenic behaviours (apart from binge eating) have also shown moderate to very high correlations with the EDE, ranging from 0.60 – 0.88 (Black & Wilson, 1996). In addition the EDEQ has demonstrated good reliability in terms of internal consistency and test-retest and validity (e.g., Binford, le Grange, & Jellar, 2005; Peterson et al., 2007). Moreover, a number of studies have indicated that the EDEQ is an effective instrument for detecting clinical cases of eating disorders within the clinical population (e.g., Carter, Stewart, & Fairburn, 2001; Fairburn & Beglin, 1994; Luce, Crowther, & Pole, 2008), community population (e.g., Mond, Hay, Rodgers, Owen, & Beumont, 2004; Mond, Hay, Rodgers, & Owen, 2006), as well as the athletic population (e.g., Hulley et al., 2007; Hulley & Hill, 2001; Pernick et al., 2006).

The EDEQ scores have been evaluated as both continuous and dichotomous variables in this thesis. Specifically, for Study 1 (Chapter 3), the global EDEQ score is used as a dichotomous variable in an attempt to determine probable cases of clinical eating disorders.

In order to detect probable cases, a cut off of ≥ 2.80 on the global EDEQ score was employed, as a score of 2.80 or higher on the global EDEQ score is said to hold high predictive validity between cases and non-cases with a sensitivity and specificity rate of .80, and a positive predictive value of .44 (Mond et al., 2008). In addition, a cut off >2.80 corresponds to the 80th and 95th percentiles from the reference norms for adult females (Mond et al., 2006). However, it should be noted previous research employing the EDEQ to detect probable cases have employed various and multiple criteria. Specifically, a cut off of ≥ 4.0 on weight and shape concern subscales (e.g., Carter et al., 2001; Luce et al., 2008), a cut off of ≥ 2.3 on the global EDEQ score, plus the occurrence of OBEs and excessive exercise at least once per week (e.g., Mond et al., 2004) and a cut off of ≥ 4 on the weight and shape concern subscale, a cut off of ≥ 4 on the global subscale and/or the occurrence of at least one pathogenic weight control method in the past 28 days (e.g., Pernick et al., 2006). However, many of these criteria have been criticised on the grounds that the inclusion of the weight and shape concern items in isolation performs poorly in detecting community cases of eating disorders (Mond et al., 2006) and that the predictive validity of self-reported assessment of eating disorder behaviours is currently unclear (Mond et al., 2008).

2.5.4. Sport-Specific Quality of Relationship Inventory (S-SQRI; Jowett, 2009)

The 18 item S-SQRI is a shorter and a more sport-specific version of the 25-item Quality of Relationships Inventory (QRI; Pierce, 1994; Pierce, Sarason, Sarason, Solky-Butzel, & Nagle, 1997). The QRI specifically measures two positive aspects of relationships through social support (provisions of support) and relationship depth (significance of relationship), as well as one negative aspect of relationship through interpersonal conflict (expressions of anger and uncertainty that accompany conflict). Employing a 4 point response scale, the subscale scores are derived from averaging the sum of items, with higher scores reflecting higher levels of support, conflict, and depth in the relationship. The QRI was specifically designed to be used with any interpersonal relationship dyad. Pierce et al. (1997) stated that “in developing the QRI . . . , we sought to avoid linking the assessment of a particular facet of personal relationships to a specific relationship category” (p. 355). As such, the QRI has been used frequently to examine a number of diverse interpersonal relationships such as the parent-child relationship, peer relationships and romantic relationships (e.g., Holt & Espelage, 2002; Pierce et al., 1997). In attempt to make the QRI

of more relevance to the interpersonal relationships that manifests in the sporting domain, Jowett (2009) eliminated 7 of the original items as they were deemed irrelevant, inappropriate, or repetitive. Subsequently, a total of 18 items were included in the S-SQRI assessing the quality of coach-athlete relationship through the components of social support (6 items; *To what extent can you really count on your coach to distract you from your worries when you feel under stress?*), relationship depth (6 items; *How positive a role does your coach play in your life generally?*) and interpersonal conflict (6 items; *How angry does your coach make you feel?*). Keeping the original scoring format, the S-SQRI is scored on a 4 point response scale ranging from 1 (*Not at all*) to 4 (*Very much*), the subscale score is derived from averaging the sum of scores, with higher scores indicating higher levels of support, conflict, and depth in the coach-athlete relationship. Jowett (2009) demonstrated high reliability, factorial, and convergent validity for the S-SQRI. For the purpose of this thesis, only the subscales of social support and interpersonal conflict were used (see Appendix 14-16) and the word coach in the S-SQRI was replaced with the word 'parent' (the parent who had the most prominent influence in the athlete's athletic career) as well the word 'teammate' (the teammate that they are the closest to on their squad/team). This procedure was deemed acceptable as the original QRI was developed to incorporate relationship quality facets that would be relevant to multiple relationship dyads. Moreover, Jowett and Cramer (2010) employed the S-SQRI to assess both the parent-athlete, and coach-athlete relationship, producing acceptable reliability.

2.5.5. Perceptions of Parents (POPS-the college-student scale; Robbins, 1994)

The POPS concern the degree to which parents provide an optimal parenting context (Grolnick, Deci, & Ryan, 1997). Based on self-determination theory (Deci & Ryan, 1985), Grolnick and colleagues (e.g., Grolnick, 2003; Grolnick & Ryan, 1989) suggested that three concepts are associated with optimal parenting. Specifically, they relate to autonomy support (the degree to which the environment allows children to feel that they initiate their actions rather than feeling coerced to act in a certain manner) structure (the extent to which parents provide clear and consistent guidelines, expectations, and rules for their children's behaviours so that they can act in self-determined ways), and involvement (the extent to which a parent is interested in, knowledgeable about, and takes an active role in the child's life). As such, two measures have been constructed to assess these constructs; a child version and a version for late adolescent and older individuals. The college student version consists of 42 items: 21

for mothers and 21 for fathers and assesses the components of autonomy support (9 items; *My mother/father seems to know how I feel about things*), parental involvement (6 items; *My mother/father finds time to talk with me*), and parental warmth (6 items; *My mother/father accepts me and likes me as I am*). Items are scored on a 7-point Likert scale, ranging from 1 (*Not at all true*) to 7 (*Very true*), of which 3 autonomy support items and 3 involvement items are reverse scored. Subscale scores are derived from averaging the sum of scores for each subscale, with higher scores reflecting higher levels of autonomy support, involvement, and warmth in the relationships. Acceptable reliability and validity has been demonstrated (e.g., Gagné, 2003; Niemiec, Ryan, & Deci, 2009; Robbins, 1994). For the purpose of this thesis, only the two subscales of autonomy support and involvement were employed (see Appendix 17-21). Moreover for athletes, the word ‘mother/father’ was also replaced with the word ‘coach’ in order to assess the quality of the coach-athlete relationship.

2.5.6. Experiences in Close Relationships (ECR; Brennan, Clark, & Shaver, 1998)

Designed to measure attachment styles in general relationships, the ECR contains 36 items, which form two subscales: anxious attachment and avoidant attachment. Specifically, the anxious attachment subscale measures the degree to which an individual fears interpersonal rejection or abandonment, the need for approval from others, and the distress that is experienced when close others are unavailable or unresponsive. An example of an anxious attachment item includes “*I worry about being alone*”. The avoidant attachment subscale measures the degree to which an individual fears dependence and interpersonal intimacy, the need for self-reliance, and the reluctance to self-disclose. An example of an avoidant attachment item includes “*I try to avoid getting too close to others*”. The items are rated on a 7 point response scale, ranging from 1 (*disagree strongly*) to 7 (*agree strongly*), of which 10 items are reverse scored. The subscale scores are derived by averaging the sum of scores; yielding three attachment styles. Specifically, high scores on the anxious subscale reflect an anxious attachment style, whilst high scores on the avoidant subscale reflects an avoidant attachment style. By contrast, low scores on both the anxious and avoidant scale reflect a secure attachment style. A number of studies have demonstrated the ECR’s internal consistency, test-retest reliability, convergent, and discriminant validity within both the general population (e.g., Brennan et al., 1998; Conradi, Gerlsma, van Duijn, & de Jonge, 2006), as well as the athletic population (e.g., Davis & Jowett, 2010).

2.5.7. Brief Fear of Negative Evaluation (BFNE; Leary, 1983a, 1983b)

The BFNE consists of 12 items selected from the original Fear of Negative Evaluation (Watson & Friend, 1969) based on satisfactory item-total correlations with the original scale. Examples of items include *'I am afraid that others will not approve of me'* and *'I am afraid that people will find fault with me'*. Items are rated on a 5 point response scale, ranging from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*). Of the 12 items, 4 are reversed scored. The global score is calculated from the sum of items, with scores ranging from 12-60, with higher scores reflecting greater fears of negative evaluation. The BFNE has demonstrated good internal consistency, test-retest reliability, as well as convergent and discriminant validity (e.g., Collins, Westra, Dozois, & Stewart, 2005; Leary, 1983b). Moreover, it has been previously used in the athletic domain (Scherwin et al., 1996), as well as in relation to physical education (Ridgers, Fazey, & Fairclough, 2007).

2.5.8. UCLA Loneliness Scale-Short (UCLA- Loneliness-Short; Allen & Oshagan, 1995)

The shortened version of the UCLA Loneliness is composed of 7 items identified as the strongest and most meaningful items underlying feelings of loneliness. An example of the items include *'I lack companionship'* and these are rated on a 4 point response scale ranging 1 (*never*) to 4 (*always*). The global score is derived from the sum of scores, with higher scores reflecting a greater degree of loneliness. The shortened UCLA Loneliness scale has demonstrated good internal consistency (e.g., Allen & Oshagan, 1995).

2.5.9. Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990)

The FMPS consists of 35 items that underline the six subscales of Concern Over Mistakes (reflects the negative reactions to mistakes, a tendency to interpret mistakes as failures, and the belief that failure inevitably results in a loss of respect from others through 9 items; *'I should be upset if I make a mistake'*), Personal Standards (reflects high standards of performance and the tendency to evaluate oneself based on performance through 7 items; *'If I do not set the highest standards for myself, I am likely to end up a second rate person'*), Parental Expectations (reflects the extent to which parents are perceived as having high expectations through 5 items; *'my parents set very high standards for me'*), Parental Criticism (reflects the extent to which parents are perceived as being overly critical through 4 items; *'my parents never tried to understand my mistakes'*), Doubts About Actions (reflects the

extent to which people doubt their ability to accomplish tasks through 4 items; *'even when I do something very carefully, I often feel that it is not quite right'*), and Organization (reflects neatness and organization through 6 items; *'organisation is very important to me'*). Items are rated on a 5 point response scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with the subscale scores derived from the sum of scores, and higher scores reflecting a greater degree of perfectionism. The FMPS has demonstrated good internal consistency, test-retest reliability, as well as concurrent, convergent, and discriminant validity (e.g., Frost et al., 1990; Frost, Turcotte, Heimberg, Mattia, Holt, & Hope, 1995). For the purpose of this thesis, only the personal standards subscale of FMPS was used, as it complies with the assertion by Shafran et al. (2002) that it is the *'closest to the clinical concept of perfectionism'* (pp.777).

2.5.10. Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978)

The DAS is a 40 item questionnaire originally designed to identify and measure cognitive distortions associated with depression (Oliver & Baumgart, 1985). However, subsequent factor analyses have revealed two distinct subscales: self-criticism perfectionism (15 items; *'If I do not do well all the time, people will not respect me'*), and need for approval (11 items; *'I cannot be happy unless most people I know admire me'*) (see Dunkley, Sanislow, Grilo, & McGlashan, 2004; Imber et al., 1990). Items are scored on a 7 point Likert scale ranging from 1 (*Totally disagree*) to 7 (*Totally agree*), with the self-critical perfectionism scale score derived by the sum of scores, and higher scores reflecting greater levels of self-criticism. The self-critical perfectionism subscale of DAS has shown high internal consistency and test-retest reliability, as well as convergent, and discriminant validity (Dunkley et al., 2004; Dunkley & Kyriarissis, 2008; Dunkley, Sanislow, Grilo, & McGlashan, 2006).

2.5.11. Rosenberg's Self Esteem Scale (RSES; Rosenberg, 1965)

The RSES is the most universally used measure of self-esteem and taps in to one's overall sense of worth as an individual (Rosenberg, 1965). It is a unidimensional instrument, composed of five positively worded items and five negatively word items. Examples of the positively worded items include *"I take a positive attitude toward myself"*, and examples of the negatively worded items include *'All in all, I am inclined to feel that I am a failure'*. Responses are rated on a 4 point Likert scale, ranging from 0 (*strongly disagree*) to 3 (*strongly agree*). The global score is calculated from the sum of scores, ranging from 0-30,

with higher scores reflecting greater levels of self esteem. The RSES has also accumulated strong evidence for the structural, predictive, convergent, and discriminant validity, as well as internal consistency reliability and test–retest reliability within community samples (e.g., Schmitt & Allik, 2005; Sinclair et al., 2010; Torrey, Mueser, McHugo, & Drake, 2000). The RSES has also been employed within the athletic population (e.g., Holm-Denoma et al., 2009; Hulley & Hill, 2001), yielding above adequate reliability and validity.

2.5.12. Symptom Checklist 90R (SCL-90; Derogatis, 1983)

Composed of 13 items, the depression subscale of SCL-90R (Derogatis, 1983) measures the current, point-in-time psychological symptoms and manifestations associated with clinical depression as defined by the DSM-IV criteria. Using a time frame of 7 days, the measure specifically assesses symptoms related to negative affect and dysphoric mood such as signs of withdrawal, lack of motivation, loss of vital energy, as well as feelings of hopelessness, thoughts of suicide, and other cognitive and somatic correlates of depression. Items are rated on a 5 point response scale ranging from 0 (*not at all*) to 4 (*extremely*), and the total score is calculated by averaging the sum of scores, with higher scores reflecting greater levels of depressive symptoms. Example items include, “*Feeling low in energy or slowed down,*” “*Feeling blue,*” and “*Worrying too much about things*”. The depression subscale of the SCL-90 has been employed amongst both the clinical and non-clinical population and has demonstrated good internal consistency, test-rest test reliability as well as convergent and discriminant validity (e.g., Derogatis; 2000; Koeter 1992; Morgan, Wiederman, & Magnus, 1998; Rauter, Leonard, & Swett, 1995). Moreover, it has been used within the athletic population, demonstrating acceptable reliability (e.g., Jowett & Cramer, 2009).

2.6. Data Analysis

This section of the chapter details the statistical analyses used in this thesis. In an attempt to reduce the risk of type I errors without limiting the probability of detecting significant findings, a significance level of $p < 0.05$ (unless stated otherwise) was employed throughout this thesis. As a directional hypothesis was formulated for each study, one-tailed tests were employed throughout (unless stated otherwise). For Studies 1, 2, 3, and 4, all statistical analyses were conducted using the Statistical Package for Social Science (SPSS), version 17.0 for Windows. For study 5, SPSS was employed for descriptive and initial

inferential analyses, while EQS (Bentler, 1997) was employed for the Structural Equation Modelling.

Preliminary descriptive analyses included establishing alpha reliability, Means, and Standard Deviations. Exploratory analyses included checks for normality employing Kolmogorov-Smirnov tests. As tests of normality were violated in most instances, non-parametric tests were employed throughout. However, parametric tests were employed in instances where a non-parametric equivalent was unavailable (e.g., Analysis of Covariance, Hierarchical Multiple regressions) and if they were considered robust against such violations of normality (e.g., Analysis of Variance). The inferential statistical analyses employed in this thesis include Analysis of Variance (ANOVA), Analysis of Covariance (ANCOVA), Multivariate Analysis of Variance (MANOVA), Mann Whitney U tests, Chi Square test of association, Spearman Rho correlations, bootstrapping mediation analyses, Wilcoxon test, Hierarchical Multiple Regressions and Structural Equation Modelling. Accordingly, they will now be discussed.

2.6.1. Study 1

2.6.1.1. Analysis of Variance (ANOVA).

Analysis of Variance (ANOVA) were employed to examine mean differences on eating psychopathology scores *between* the four performance standards (i.e., elite, developmental, recreational, and non-athlete), as well as gender differences *between* these performance standards. BMI and age have been frequently suggested to influence scores on eating disorder questionnaires (e.g., Hulley et al., 2007; Pernick et al., 2006; Petrie, 1996), and, as such, significant differences were detected on age and BMI between the four performance standards. Thus, these variables were included as covariates in Analysis of Covariance (ANCOVA), but the results did not differ significantly when adjusting for BMI and age, therefore only the unadjusted ANOVA results are reported in this thesis. To account for the unequal N sizes, Games Howell post hoc analyses were used, as it is considered to be a more accurate post hoc test when sample sizes are unequal (Field, 2005). Moreover, in instances where the homogeneity of variance was violated in ANOVA, the Welch F statistic has been reported, as it is considered as the more robust test. It has been advised that in cases where the homogeneity of variance has been violated, either the Brown-Forsythe's F statistic or Welch's F statistic should be employed as they make adjustments to the F value and

degrees of freedom, thus combating the problems associated with the violation of homogeneity. The Welch F statistic was chosen over Brown-Forsythe's F statistic on the premise that the Welch F fares better in terms of power (Field, 2005).

2.6.1.2. Analysis of Covariance (ANCOVA).

Analysis of covariance (ANCOVA) were employed to examine sport type differences on mean eating psychopathology scores *between* the three athletic performance standards (i.e., elite, developmental, recreational), while controlling for the effect of gender. ANCOVAs were also conducted controlling for the effect of BMI and age, but the results did not differ significantly when adjusting for BMI and age, therefore only the adjusted ANCOVA for the effect of gender is presented. Post hoc analyses were conducted employing the Bonferroni correction, adjusting for the effect of gender.

2.6.1.3. Mann Whitney U tests.

Mann Whitney tests were used to examine gender and sport type differences in the mean eating psychopathology scores *within* each performance standard. As the Mann Whitney tests provide only the two tailed probability, the significance value was divided by two to calculate the one tailed probability (Field, 2005).

3.6.1.4. Chi Square Test of Association.

Chi Square analyses were conducted to determine the differences in the frequency of key eating disorder behaviours and prevalence estimates between elite, developmental, recreational athletes, and non-athletes, as well as detecting gender and sport type differences in these prevalence rates *across* and *within* each performance standard.

2.6.2. Study 2 and 3

First, Mann Whitney U tests were conducted to detect group differences. Next, Spearman Rho correlational analyses were employed to examine associations between all study variables.

2.6.2.1. Hierarchical Multiple Regressions (HMR).

Hierarchical Multiple Regressions were conducted to compare the predictive role of the range of interpersonal difficulties indices (e.g., situational v dispositional interpersonal difficulties), where eating psychopathology scores were entered as the dependent variable and the interpersonal difficulties as the predicting variables. Significant gender differences were detected in the eating psychopathology scores and as such their relation to eating psychopathology was accounted for. Controlling for gender differences ensured that the predictive variance explained by interpersonal difficulties on eating psychopathology was over and beyond the effect of gender. Therefore, gender was entered in the first step of the hierarchical regression and then interpersonal difficulties variables were entered into the second step.

2.6.2.2. Bootstrapping Mediation Analyses.

A series of the relatively new bootstrapping mediation analyses were employed in both these studies to assess the mediating effects of the intervening variables. The most commonly advocated and widely used mediational analytical procedure is the causal steps approach put forward by Baron and Kenny (1986). Accordingly, for a mediation to hold (full or partial), the following conditions must be met; (a) the independent variables (IVs; interpersonal difficulties) must predict the dependent variable (eating psychopathology); (b) the independent variables must predict the mediating variables (MVs; self-esteem, depression, clinical perfectionism); and (c) the mediating variable must significantly predict the DV while the IV is being controlled. If the effects of the IVs on the DV in the third equation are less than the effect in first equation, then partial mediation is inferred, whereas a full mediation is inferred when the effect in the third equation becomes non-significant between IV and DV. Despite its common usage amongst psychology researchers, this approach is considered not to be suitable for testing the effect of multiple mediators simultaneously (MacKinnon, 2008). Although the causal step approach is thought to provide an estimate of the total mediated effect of the IV on the DV via the MVs, estimates of the specific indirect effect of each separate mediator are not available, along with their standard error, thus being unable to estimate the individual effect that each mediator contributes to the total effect. Moreover, a prerequisite of the causal steps approach is that there needs to be a direct relationship between the IV and the DV. However, it has been proposed that this relationship is not necessary for detecting whether mediation exists (see MacKinnon, Krull,

& Lockwood 2000; Shrout & Bolger, 2002; Zhao, Lynch, & Chen, 2010 for a detailed review) and that the IV can still be related to the DV indirectly through the intervening variables (e.g., Holmbeck, 1997; MacKinnon, 2008). Overemphasising the importance of the association between the IV and the DV before or after controlling for the mediator can also lead to misleading, or even false conclusions in theory testing (Rucker, Preacher, Tormala, & Petty, 2011). As such, the causal steps approach has been highlighted as lacking power in a series of simulation tests (e.g., Hayes, 2009; MacKinnon, 2008; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002), meaning that if the effect of the IV is carried indirectly through the MV then the causal step approach is the least likely method to detect the effect.

Subsequently, an alternative method has been suggested for assessing the indirect effect of multiple mediators: bootstrapping mediation analyses. This approach is thought to hold the highest power, and possess the best Type I error control (e.g., Hayes, 2009; Preacher & Hayes, 2004). Another advantage is that no assumptions about the shape of the sampling distribution of the indirect effect are made (Preacher & Hayes, 2008). Moreover, the inclusion of multiple mediators simultaneously is said to purify the indirect effect by controlling for all the other mediators, as well as reducing the alpha inflation that would result from using a series of single mediator models (Opdenacker, De Bourdeaudhuij, Vanden Auweele, & Boen, 2009). Specifically, this procedure consists of simultaneously estimating the effect of the IVs on the proposed MVs; estimating the proposed MVs on the DV, while controlling for the IVs; estimating the direct and indirect effects of the IVs on the DV through the proposed MVs via Ordinary Least Squares (OLS); and computing confidence intervals (CI) for the indirect effects for which the end points are derived from bootstrapping.

Bootstrapping is a computationally driven re-sampling method, which provides an empirical representation of the sampling distribution of the indirect effect of multiples mediators by treating the sample under study as a representation of the population in miniature; one that is repeatedly re-sampled during the analysis as a way of mimicking the original sampling process (Preacher & Hayes, 2004). The re-sampling of the sample is performed with replacement, whereby the new sample of size n is assembled by sampling cases from the original sample. Bootstrapping also allows any case that has been drawn to be redrawn as the resample is constructed. With the new re-sampled size of size n , (the same number as original) all the statistics (e.g., total effects, indirect effects) are re-estimated. This process is repeated a k number of times (minimum of 1000 times), yielding k estimates of the

total and specific indirect effects of the independent variable on the dependent variable. Once completed, the specific indirect effect through the mediating variables is calculated by placing the k estimates of the mediated effect in ascending order; producing a *percentile* bootstrap confidence interval (CI) for the population. The lower bound of the CI% is calculated as the value of the indirect effect at the $k(.5-ci/200)^{th}$ ordinal position, while the upper bound is defined as the value at the $1+k(.5+ci/200)^{th}$ position. For example, in a set of 1000 repetitions, the lower bound of CI% is captured as the value of the mediated effect at the 25th ordinal position, while the upper bound of the CI% is the value at the 976th ordinal position for a 95% confidence interval. The percentile CI can also be adjusted to yield a *bias corrected* confidence interval (Hayes, 2009). The bias-corrected bootstrap tests of mediation are identical to the percentile bootstrap test of mediation, except that it corrects for skew in the population (Fritz & Mackinnon, 2007). Moreover, the bias corrected CIs are believed to improve power and Type I errors than the percentile CI (MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2008). Consequently, the *bias corrected* 95% CI on 5000 bootstrapped samples was implemented in Studies 2 and 3. Therefore, if zero is not between the bias corrected lower and upper bound, then it can be claimed that the indirect effect is not zero with 95% confidence, which is conceptually regarded as the same as rejecting the null hypothesis (Preacher & Hayes, 2004) and that the indirect effect is significant at the .05 significance level (Shrout & Bolger, 2002).

Zhao et al. (2010) further proposed that mediated effects can be classified into three types. The first form of mediation proposed was an *indirect-only mediation*, where there is no direct link between the IV and the DV, but the link is indirectly mediated by the proposed MVs. In essence, this is said to overlap with the concept of full mediation as proposed by Baron and Kenny (1986). The second form of mediation is *complementary mediation*, where both the mediated effect (indirect effect) and the direct effect exist concomitantly, and are in the same direction. The third type of mediation is *competitive mediation*, whereby the mediated effect and the direct effect both exist, but the effects are in opposite directions. Theoretically, Zhao et al. argued that complementary and competitive mediations are characteristic of partial mediations as proposed by Baron and Kenny. As such, these classifications were employed to explain the type of mediations detected in this thesis.

Thereafter, to examine whether the specific indirect effect of the IV on the DV through proposed MVs differed in size according to the multiple mediators, the specific indirect effect of each mediating variable was then contrasted against each other. This is

computed by deriving the standard error for differences between specific indirect effects and subsequently, a sampling distribution of this contrast is generated. The upper and lower bias corrected CI $100(\alpha/2)^{\text{th}}$ and $100(1-\alpha/2)^{\text{th}}$ percentiles are then used to test the hypothesis that the contrast equals zero (Preacher & Hayes, 2008). If zero is not between the lower and upper bound, again it can be claimed that there are significant differences between the indirect effects (e.g., one mediator performed better than the other). All bootstrap mediational analyses in this thesis were conducted using a macro for SPSS designed to assess indirect effects of multiple mediators (Preacher & Hayes, 2008).

2.6.3. Study 4

A two-tailed Wilcoxon test was first used to compute any significant changes in study variables over the course of the study. Next, one-tailed, partial correlations were conducted to detect significant associations between baseline interpersonal difficulties and eating psychopathology at time 2, while controlling for the effect of baseline eating psychopathology scores.

2.6.3.1. Hierarchical Multiple Regressions (HMR).

To determine the interpersonal difficulties predictors of T2 eating psychopathology, HMR was conducted, while statistically controlling for the initial levels of eating psychopathology. Controlling for the initial levels of eating psychopathology ensured that variance explained by the interpersonal difficulties on T2 eating psychopathology was over and beyond the effect of the temporal stability of athletes' eating psychopathology scores (Gilbert & Meyer, 2005a). Therefore, the T1 eating psychopathology score was entered in the first step of the HMR and then the T1 interpersonal difficulties scores were entered in the second step. Additionally, BMI scores have been suggested to influence athletes' eating psychopathology scores (e.g., Hulley et al., 2007; Pernick et al., 2006), and as such their relation to T2 eating psychopathology was tested (T1 and T2 BMI scores), but no significant associations were found ($p > .05$). Thus, BMI scores were not controlled for in HMR analyses. Moreover, gender differences were also examined, but there were no significant differences between males and females in T2 eating psychopathology scores, therefore gender was also not controlled for in the HMR analyses. Finally, depression is considered to be comorbid with eating disorders (O'Brien & Vincent, 2003) and as such their relation to T2 eating

psychopathology was tested and was found to be non-significant, therefore T1 depression was not controlled for in the final HMR analyses.

2.6.4. Study 5

Spearman Rho correlational analyses were first employed to examine associations between all study variables. Next, structural equation modelling (SEM) using EQS (Bentler, 1997) employing Maximum Likelihood estimation procedure was employed to test the applicability of the constructs related to transdiagnostic cognitive-behavioural model.

2.6.4.1. Structural Equation Modelling (SEM)

SEM represents translations of a series of hypothesised ‘cause and effect’ relationships between variables into a composite hypothesis concerning patterns of statistical dependencies (Shipley, 2000), and offers a comprehensive method for the simultaneous quantification and testing of theoretical models (Pugesek, Tomer, & von Eye, 2003). Specifically, the theoretical model represents causal processes that generate observations of multiple variables (Bentler, 1980) and the relationships between such variables are described as parameters that indicate the magnitude of the effect (either direct or indirect) that the independent/exogenous variable(s) has on the dependent/endogenous variable(s). As such, if the model achieves acceptable ‘goodness of fits’ (see further down the chapter for description) then it is argued that the postulated relations of the model are plausible; however if the goodness of fit indices are inadequate/unacceptable, then the tenability of such relations are rejected (Byrne, 2006). SEM’s main advantage over other techniques is that it is multivariate, and as such can simultaneously assess several regressions at one given time, as well as allowing variables to be classified as both exogenous and endogenous within the same model (Schumacker & Lomax, 2004). Moreover, it takes a confirmatory approach to data analysis as opposed to exploratory, by demanding that the pattern of observed relationships are specified prior to model testing (Byrne, 2006). Finally, it exerts the ability to account and correct for measurement errors, be it random (e.g., sampling error) or systematic (e.g., underlying psychometric properties related to the measure) as the analysis is conducted at the measurement level, by incorporating the error/residual error variance in the estimated model which traditional multivariate analyses are not capable of (Kline, 2005), as well as at the structural level by incorporating disturbances.

2.6.4.2. Two step Approach to SEM.

It is generally accepted that a two step approach is undertaken when conducting SEM (e.g., James, Mulaik, & Brett, 1982; Kline, 2005; Schumacker & Lomax, 2004). Specifically, this approach involves the testing of two models; the measurement model and the structural model.

2.6.4.2.1. Observed and latent variables.

Before, proceeding into the measurement and structural model, it is important to note that there are two primary variables in SEM; observed (indicators; e.g., individual items pertaining to psychometric instruments) and latent (constructs; e.g., subscales of psychometric instruments). Specifically, latent variables are not measured directly, rather they are inferred constructs measured indirectly through the observed variables. It is common that multiple observed variables underline the latent variable, and as such the benefit of this is that measurement errors related to the reliability or the validity of the observed variable are accounted for (Kline, 2005).

2.6.4.2.2. Measurement model.

The measurement model is a confirmatory factor model and is often conducted first in SEM. The main objective of the measurement model is to discover the reliability and the validity of the observed variables in relation to the latent variable (e.g., are the observed variables accurately measuring the construct under examination). As such, the relationship between the latent variable and the observed variables are indicated by factor loadings (Byrne, 2006). The factor loadings generate and highlight the extent to which the observed variables are able to measure the latent variable. In addition to producing factor loadings, the measurement model also generates the measurement error associated with the observed variables. Measurement error specifically highlights the extent to which the observed variables are measuring something else other than the latent variable that it is proposed to measure (Kline, 2005). As such, a factor loading of .40 per observed variable is deemed acceptable (Ford, MacCallum, & Tait, 1986).

2.6.4.2.3. Structural model.

The second process in SEM involves the structural model. While the measurement is concerned with the reliability and validity of the latent variables, the structural model is primarily concerned with the interrelations between the latent variables. Specifically, the

structural model tests the extent to which the hypothesised or theorised relations between the latent variables are supported within the current sample under investigation.

Prior to conducting SEM analyses, it is advised that three preliminary issues related to sample size and convergence, model specification, and model identification are addressed (Marsh, 2007; Schumacker & Lomax, 2004). Each issue will now be discussed accordingly.

2.6.4.3. Sample size and item parcelling.

In order for the model to converge (run), it is recommended that there are between 5-10 participants per observed variables (e.g., Bentler & Chou, 1987; Byrne, 2006). However, as the present study utilised 127 observed items, 635-1270 participants were required. A common method to overcome this shortage in participant numbers is item parcelling; whereby the items of the underlying latent variable are grouped together to produce parcels of two to six (Marsh & Hau, 1999; Yang, Nay, & Hoyle, 2010). There are numerous empirical justifications for using parcelling, including increased reliability (Kishton & Widamann, 1994), achieving normality within the data (Bandalos, 2002; Nasser & Wisenbaker, 2003), remedy small sample sizes and unstable parameter estimates (Bandalos & Finney, 2001), as well as a greater likelihood of achieving a proper model solution (Bandalos, 2002; Marsh, Hau, Balla, & Grayson, 1998). However, such adventurous properties of item parcelling are only said to be effective if the observed items of the underlying latent factor are uni-dimensional (Bandalos, 2002; Hall, Snell, & Foust, 1999, Yang et al., 2010). Empirically, the effects of parcelling over the individual indicators of the latent factors have been documented in several simulation studies (e.g., Bandalos, 2002; Marsh et al., 1998; Yuan, Bentler, & Kano, 1997) and results have demonstrated that it is more beneficial to parcel rather than to use the same number of individual items, as when parcels were used, not only were the fit indices more adequate, but the results were more likely to yield a proper solution.

Therefore in an attempt to fulfil the recommended 10:1 ratio of subjects to observed variables, item parcelling was conducted in this thesis. Several methods for parcelling have been suggested, including, parcelling all items into a single parcel (mean of each latent variable), splitting all odd and even items into two parcels, randomly selecting a certain number of items to create three or four parcels (e.g., Yang et al., 2010), parcelling items that have similar factor loadings (Cattell & Burdsal, 1975), parcelling items with high factor loadings with low factor loadings to equalise the loadings (Russell, Kahn, Spoth, & Altmaier, 1998) and parcelling items according to their skew (Hau & Marsh, 2004; Nasser-Abu Alhija

& Wisenbaker, 2006; Thompson & Melancon, 1996). For the purpose of the current study, the guidelines of Hau and Marsh (2004) and Nasser-Abu Alhija and Wisenbaker, (2006) were adhered to, where items were parcelled according to the size and direction of their skew. In particular, the most skewed items were parcelled with the least skewed items, then the next most skewed to the next least skewed and so on. In addition to this, this process was counter balanced in that items that were negative skewed were parcelled with positively skewed items.

2.6.4.4. Model specification and model identification.

Model specification relates to the process where assertions are made about which effects are null, which are fixed and which are freely estimated (see Figure 2.1). Model identification refers to whether the unique set of parameters is consistent with the data. Specifically, identification relates to the transposition of the variance–covariance matrix of the observed variables (the data points; number of observed variables) into the structural parameters of the model under examination (Byrne, 2006). There are three variants of model identification; *under-identified*, *just-identified* and *over-identified*. An *under-identified* model refers to a model where the number of parameters to be estimated exceeds the number of variances and covariances (data points). This type of model is perceived as problematic because the model is considered as containing insufficient information to attain a fixed solution of parameters estimation, meaning that there are an infinite number of possible solutions (Byrne, 2006). Moreover, the parameter estimates are considered to be untrustworthy (Kline, 2005). A *just-identified* model refers to a model where the number of variance and covariance equals the number of parameters to be estimated (e.g., a saturated model). Consequently, this type of model is also considered problematic as it will always achieve a perfect fit to the empirical data (Pugesek et al., 2003) and can never be rejected. The final variant of model identification is an *over-identified* model. This refers to models when the number of available covariances and variances are greater than the number of parameters to be estimated, thus resulting in positive degrees of freedoms, allowing for model rejection.

To calculate whether a model is identified, the following equation is often employed, where p = data points/number of observed variables.

$$p(p+1)/2 > \text{parameters to be estimated}$$

Employing the aforementioned equation, the model identification of the hypothesised model was tested prior to model estimation (see Figure 2.1), revealing an over-identified model, with 1057 degrees of freedom.

$$\begin{aligned} &= P(P+1)/2 \text{ information points} > \text{parameters to be estimated} \\ &= 48(49)/2 \text{ information points} > 37 \text{ factor loadings, 48 errors, 31 path coefficients} \\ &\quad \text{and disturbances, and 1 covariance} \\ &= 1176 \text{ information points} > 119 \text{ parameters to be estimated} \\ &= 1057 \text{ dfs} \end{aligned}$$

2.6.4.5. Model estimation and model evaluation.

Following model specification and identification, the hypothesised model was estimated using the Maximum Likelihood estimation procedure. In order to find a statistically significant theoretical model with practical and substantive meaning, multiple goodness of fit indices to assess the model fit have been put forward. First is the non statistical significance of the chi square (χ^2). A non-significant χ^2 suggests that the sample covariance (e.g., theoretical model) and the reproduced model implied covariance matrix (tested model) are similar. However, it should be noted that χ^2 is considered to be highly sensitive to sample size (Cheung & Rensvold, 2002). Specifically, the larger the sample size (generally over 200), greater the tendency for χ^2 to be significant, whereas with a lower sample size (below 100), the χ^2 test has a tendency to indicate a non-significant probability level. As such, Kline (2005) recommended employing the normed chi-square, which is calculated by dividing the chi-square value by the degrees of freedom. A normed chi-square value of less than 3 has been suggested to indicate a reasonable fit to the data (Bollen, 1989). In addition to the χ^2 statistic, other incremental fit indexes have also been proposed to supplement the χ^2 test, which are said to be designed to avoid the problems associated with sample size as related to the χ^2 test (Bentler & Bonett, 1980). These include the Root – Mean-Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), the Non Normed Fit Index (NNFI), Tucker-Lewis Index (TLI) and Goodness of Fit (GFI) Specifically, a RMSEA value of $<.05$ indicates a good fitting model (Browne & Cudeck, 1993). For the remaining fit indices; a value $>.90$ is regarded as an acceptable fit of data (e.g., Kline, 2005; Marsh, 2007; Marsh, Hau, & Wen, 2004). Consequently, for the purpose of this study, the significance of χ^2 , the normed chi-square, the RMSEA, NNFI and the CFI were all used to evaluate the fit of the tested model. In addition, due to the current data

violating the multivariate normal assumption, which can distort statistical model fitting results, robust measures of fit were used. In other words, all chi-square and comparative fit indices took non-normality into account.

2.6.4.6. Multi-group invariance testing.

Once a satisfactory overall measurement and structural model meeting the aforementioned criteria was composed for the whole athletic population, the model was subjected to further tests that aimed to assess whether its estimates varied across groups (i.e., gender, sport type, and performance standard).

2.6.4.6.1. Multivariate Analyses of Variance (MANOVA).

Prior to conducting multi-group invariance tests, a series of MANOVAs were conducted to examine group differences on the study variables according to gender, sport type and performance standard. Due to the unequal sample sizes between groups, the Pillai trace is reported (Field, 2005). Moreover, the Pillai trace statistic is considered to be more robust against violations of assumptions, than the other statistics provided such as Wilks Lambada and Hotelling Trace (Tabachnick & Fidell, 2001). However, it should be noted that as only two groups were compared in each case (e.g., males v females; individual v team sports; elite v non-elite), the F statistic is the same for Pillai Trace, Wilks Lambada, and Hotelling Trace.

2.6.4.6.2. Multi-group Invariance Testing.

To address group invariance, the steps of Byrne (2006) were followed to cross validate the casual structure of the final model across gender, sport type, and performance standard. First, two separate single group models were conducted (i.e., male versus female; individual versus team sports; and elite versus non-elite performance standard). If these pairs of models produced satisfactory model fits, an unconstrained baseline model analysing the data for both groups simultaneously was achieved. Subsequently, a cross group equality constraint was imposed on all the factor loadings, factor variances, and path coefficients forcing the computer to derive equal estimates of those parameters. Jöreskog (1971) also purposed placing constraints on the error residuals and their covariances, however Bentler (2005) and Byrne argued that constraining error residuals and their covariances is an overly restrictive test of data and that testing such parameters is probably of least importance and interest. As such, constraints were only imposed on the former mentioned parameters.

Subsequently, the CFI fit index of the model with its parameters constrained to equality was then contrasted against that of the unconstrained baseline model. If the relative fit of the constrained model was less than the unconstrained model by 0.01, it was concluded that the model differed across groups (Cheung & Rensvold, 2002).

2.7. Ethical Considerations

The procedures carried out in the current programme of study were approved by Loughborough University Research Ethics Committee. Informed written consent was obtained from all participants after they were informed about the voluntary, confidential, and anonymous nature of the study. Participants were also informed that they had the right to withdraw without penalty at any stage of the study. All data was kept on a password protected computer, or in a locked filing cabinet in accordance with the Data Protection Act 1998.

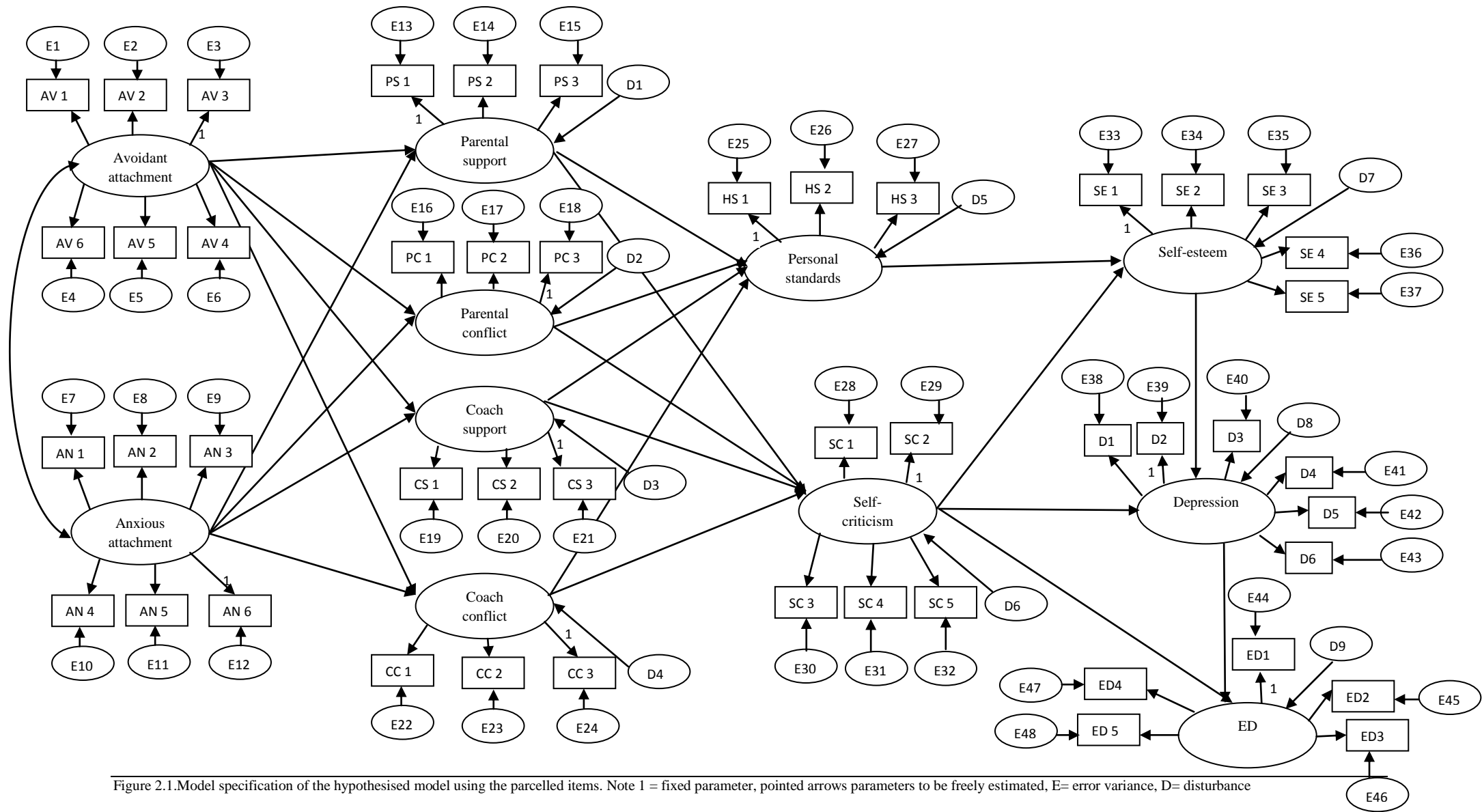


Figure 2.1. Model specification of the hypothesised model using the parcelled items. Note 1 = fixed parameter, pointed arrows parameters to be freely estimated, E= error variance, D= disturbance

STUDY 1

The Prevalence of Eating Disordered Psychopathology amongst British Athletes

In recent years, athletes have been frequently identified as at more risk of developing eating disorders than the general population (e.g., Hausenblas & Carron, 1999; Smolak et al., 2000; Sundgot-Borgen & Torstveit, 2004). However, a close inspection of the literature has highlighted that the prevalence rates are inconsistent and contradictory. Moreover, literature pertaining to British athletes is limited, with only a handful of studies identified to examine the prevalence of eating disorders and disordered eating amongst British athletes (e.g., Hulley et al., 2007; Hulley & Hill, 2001; Nordin et al., 2003). Thus, guided by the recommendations of Petrie and Greenleaf (2007), the central focus of Study 1 was the identification of the prevalence of potential cases of eating disorders amongst elite, developmental, and recreational athletes, as well as a control group of non-athletes. Additionally, gender and sport type differences *between* and *within* these performance standards were also examined.

3

The Prevalence of Eating Disordered Psychopathology amongst British Athletes

Abstract

Objective: To determine and compare the prevalence of self-reported eating disordered psychopathology and behaviours in elite, developmental, and recreational British athletes against a sample of British non-athletes, as well as examine gender and sport type differences *between* and *within* the aforementioned performance standards. **Method:** An opportunity sample of 945 British athletes and 129 British non-athletes completed the Eating Disorder Examination Questionnaire (EDEQ). **Results:** Six percent of elite athletes, 5.9% of developmental athletes, 9.9% of recreational athletes, and 11.6% of non-athletes were classified as potential cases with eating disorders. Although some notable gender and sport type differences were found on the eating psychopathology scores between and within performance standards, there were no significant gender and sport type differences in the prevalence rates between these performance standards. However, significant gender differences were detected in the prevalence rates at the elite and non-athlete standard, with a higher proportion of elite and non-athlete females classified as potential eating disordered cases than their male counterparts. **Conclusion:** The current findings provide evidence to suggest that although there are no significant differences in the prevalence of eating disorders amongst athletes and non-athletes, eating disorders are more common amongst the general population than athletes, with female non-athletes identified as at high risk. However, males and females who engage in sports for a recreational purpose (regardless of sport type) may also be at a higher risk of developing an eating disorder than their competitive counterparts.

3.1. Prevalence of Eating Disordered Psychopathology amongst British Athletes

The athletic population is unique and diverse, composed of athletes with a broad range of sporting abilities, competing at various competitive levels, and in a wide range of sports. Since the mid 1980s there has been an increase in the number of cases of eating

disorders reported amongst athletes, and several studies have revealed that the prevalence of eating disorders is higher in athletes than non-athletes (e.g., Hausenblas & Carron, 1999; Smolak et al., 2000; Sundgot-Borgen & Torstveit, 2004). Yet, alarmingly, a closer inspection of the literature shows that the prevalence of eating disorders amongst athletes is contradictory, and poorly established, with widely ranging prevalence rates of 0%-89% (e.g., Johnson et al., 1999; Quah et al., 2009). Although the variation in prevalence rates is largely dependent on the sample that is under examination (e.g., the gender of athletes, the type of sport they engage in, the performance standard they compete at), it can also be attributed to more serious methodological issues such as varying definitions of 'eating disorders', inadequate sample sizes, and narrow focus on elite female athletes involved in single 'high risk' sports (see section 1.5 for more details). Moreover, a review of the literature has also highlighted that studies on British athletes is limited. Specifically, it was noted by Hausenblas and Carron that only two studies were conducted using British athletes, whereas the remaining 78 studies were conducted outside of the UK. Although there has been a slight increase in the number of British studies published since (e.g., Hulley et al., 2007; Hulley & Hill, 2001; Nordin et al., 2003), these studies are also confounded by the aforementioned methodological weaknesses, thus making an accurate interpretation of prevalence rates amongst British athletes difficult.

While an 'accurate' account of the prevalence of eating disorders amongst athletes in general remains uncertain, there is increasing evidence to suggest that certain subgroups of athletes show increased vulnerability for eating disorders than others. Specifically, eating problems appear to be more prominent in female athletes than male athletes (Martinsen et al., 2010; Sundgot-Borgen, & Torstveit, 2004), with female athletes considered 9 times as likely to display BN symptoms, and twice as likely to report AN symptomatology than male athletes (Johnson et al., 1999). In addition, athletes competing in sports where there is an emphasis on leanness (Byrne & McLean, 2001; Picard, 1999; Smolak et al., 2000; Torstveit et al., 2008), sports where there is a weight restriction (Sundgot-Borgen, 1993, 1994), aesthetic sports (Davison et al., 2002; Hausenblas & Carron, 1999; Sundgot-Borgen; 1993, 1994) and individual sports (e.g., Haase, 2009) are also considered at increased risk. Correspondingly, it has also been proposed that as the competitive level increases, as athletes encounter more intense training, and greater pressure to maintain a specific weight, their susceptibility to eating disorder also increases (Sundgot-Borgen, 1994). While there is some

evidence to support this trend (e.g., Picard, 1999; Smolak et al., 2000), there is also evidence to suggest that eating disorders may be more common amongst the lower competitive levels such as collegiate, club, and recreational level (e.g., Hausenblas & Carron, 1999; Hausenblas & McNally, 2004; Levitt, 2008; Pritchard et al., 2007).

In summary, the research on the prevalence of eating disorders amongst athletes in general is contradictory, with limited research focusing on British athletes. While there is evidence to suggest that prevalence of eating disorders may vary between different performance standards, it is unclear at which performance standard athletes experience more eating disorder symptomatology. Therefore, prevalence rates need to be established accordingly for each performance standard, as well as determining the differences that may exist *between* and *within* each performance standard. Exploration of such differences in athletes' eating psychopathology is warranted for several reasons. First, it would provide a clearer picture of the prevalence of eating disorders amongst athletes across all competitive standards. Second, by determining which subgroup of athletes are at increased risk, these groups can be targeted with specifically tailored education programmes and prevention strategies designed to reduce the risk for that particular subgroup can be put in place.

Therefore, the central aim of the present study was to determine and compare the prevalence of potential cases of eating disorders amongst a large representative group of British male and female athletes competing at the elite, developmental, and recreational standard, and a control group of British male and female non-athletes. In keeping with prior findings (e.g., Hausenblas & Carron, 1999; Smolak et al., 2000; Sundgot-Borgen & Torstveit, 2004), it was first hypothesised that British athletes competing at the elite, developmental, and recreational standard would report higher eating disordered psychopathology and engagement in pathogenic behaviours than British non-athletes. Moreover, it was hypothesised that the prevalence of eating disordered cases would be higher amongst all groups of athletes than non-athletes. In keeping with the more recent trend of findings (e.g., Hausenblas & Carron, 1999; Hausenblas & McNally, 2004; Levitt, 2008; Pritchard et al., 2007), it was further hypothesised that developmental athletes (e.g., university 1st team, county, regional, and club level) would be the performance standard identified as at most risk (e.g., reporting higher eating disordered psychopathology, higher engagement in pathogenic weight control methods and the highest prevalence rate).

The second aim of the study was to examine gender differences *between* and *within* elite, developmental, recreational, and non-athletes on eating disordered psychopathology and behaviours. In keeping with previous research (e.g., Sundgot-Borgen & Torstveit, 2004) it was hypothesised that elite, developmental, and recreational male and female athletes would report higher eating disordered psychopathology and engagement in pathogenic behaviours than their non-athletic counterparts. It was also hypothesised that the prevalence of eating disordered cases would be higher amongst all groups of male and female athletes than their non-athletic counterparts, with developmental male and female athletes identified as at most risk. In keeping with prior findings (e.g., Johnson et al., 1999; Striegel-Moore & Bulik, 2007) it was further hypothesised that all female athletes and female non-athletes would report higher eating disordered psychopathology, as well as engagement in key pathogenic behaviours than their respective counterparts. Finally, it was expected that the prevalence of eating disordered cases would be higher in female athletes and non-athletes than their respective male counterparts.

The final aim of this study was to examine the sport type differences *between* and *within* elite, developmental, and recreational athletes on eating disordered psychopathology and behaviours. In particular, the current study examined sport type differences in terms of Sundgot-Borgen and colleagues' classification system (e.g., Sundgot-Borgen, 1993; Sundgot-Borgen & Larsen, 1993) and in terms of individual versus team sports. Based on recent findings (e.g., Hausenblas & Carron, 1999; Levitt, 2008; Pritchard et al., 2007) it was first hypothesised that developmental athletes competing in aesthetic, endurance, weight class, power, technical, and ball sports would report higher eating disordered psychopathology, engagement in pathogenic behaviours, as well as a higher prevalence of eating disorders than their counterparts at the elite and recreational standard. Secondly, it was hypothesised that athletes competing in aesthetic, endurance, and weight class sports would report higher eating disordered psychopathology, engagement in pathogenic behaviours, as well as a higher prevalence of eating disorders than athletes competing in ball, power and technical sports *within* each performance standard. Correspondingly, it was hypothesised that developmental athletes competing in individual and team sports would report higher eating disordered psychopathology, engagement in pathogenic behaviours, as well as a higher prevalence of eating disorders than their counterparts at the elite and recreational standard. Finally, based on the recent findings of Haase (2009), it was predicted that athletes competing in individual

sports would report higher eating disordered psychopathology, engagement in pathogenic behaviours, as well as a higher prevalence of eating disorders than athletes competing in team sports *within* each performance standard.

3.2. Method

Participants

The sample included 945 British athletes, representing 64 events/sports (see Table 3.1 for a breakdown of the sports) and 129 British non-athletes.

Elite-athletes. The elite sample consisted of 249 British athletes (104 males and 145 females) with a mean age of 20.77 years ($SD= 3.07$, 16-34) and a BMI of 22.15 ($SD=2.77$). Athletes were classified as elite on the basis that at the time of the study they represented their country at the international (55%) or national level (45%). Ninety-two percent of the elite athletes were British White, 2.8% British Black, 1.6% was British Asian, 1.6% was British Mixed-race, and 2.4% specified British Other. Elite athletes had been participating in their chosen sport for an average of 8.99 years ($SD=4.59$) and trained an average of 13.12 hours per week ($SD=6.68$). Forty-five percent of elite athletes reported attempting to lose weight in the past 12 months, while 16% of the athletes attempted to gain weight in the past 12 months and 3.2% attempted to lose and gain weight in the past 12 months. Almost 4 % of elite athletes reported a previous history of eating disorders, while two athletes self-reported a current eating disorder, of which neither was seeking treatment. The average number of times elite athletes have attempted to diet in the past 12 months was 2.20 times ($SD=6.51$) and the average number of times they had dieted over the course of their athletic career was 5.27 times ($SD=15.07$).

Developmental-athletes. The developmental sample was composed of 505 British athletes (238 males and 267 females) with a mean age of 20.63 years ($SD= 3.37$, 16-41) and a BMI of 22.60 ($SD=2.85$). Athletes were classified as developmental on the basis that at the time of the study they competed at county/regional level (33%), club level (33%), or for university 1st team (34%). Eighty-nine percent of the developmental athletes were British White, 3.2% were British Black, 4.6% were British Asian, 1.8% was British Mixed-race, and 1.8% specified British Other. Developmental athletes had been participating in their chosen sport for an average of 8.30 years ($SD=5.30$) and trained an average of 7.22 hours per week

(SD=4.30). Thirty-three percent of developmental athletes attempted to lose weight in the past 12 months, while 15% attempted to gain weight and 1.8% attempted to lose and gain weight in the past 12 months. Four percent of athletes reported previous eating disorders, while four athletes self-reported a current eating disorder, of which none were currently seeking treatment. The average number of times developmental athletes reported dieting in the past 12 months was 1.06 times (SD=3.56) and the average number of times they had dieted over the course of their athletic career was 3.22 times (SD=9.88).

Recreational Athletes. The recreational sample consisted of 191 athletes (98 males and 93 females) with a mean age of 21.68 years (SD= 4.65, 16-42) and a BMI of 23.26 (SD=3.28). Athletes were classified as recreational on the basis that at the time of the study they competed in sport for university 2nd team and below (62%), or at a recreational level (38%). Eighty-six percent of recreational athletes were British White, 3.7% were British Black, 1.6% was British Asian, 6.8% were British Mixed-race, and 2.1% specified British Other. Recreational athletes had been participating in their chosen sport for an average of 7.29 years (SD=6.70) and trained an average of 5.27 hours per week (SD=3.24). Thirty-seven percent of recreational athletes attempted to lose weight in the past 12 months, while 14% attempted to gain weight and 1% attempted to gain and lose weight in the past 12 months. Nearly 5% of recreational athletes reported a past history of eating disorders, while two athletes self-reported a current eating disorder, of which neither was seeking treatment. The average number of times recreational athletes attempted to diet in the past 12 months was 1.38 times (SD=4.36) and the average number of times they had dieted over the course of their athletic career was 3.53 times (SD=9.14).

Non-athletes. The non-athlete sample consisted of 129 British non-athletes (46 males and 83 females) with a mean age of 20.66 years (SD= 2.76; range =18-32) and a BMI of 22.31 (SD=2.98). Non-athletes self-reported competing in no organised sport or physical activities (e.g., gym). Eighty-four percent of the non-athletes were British White, 10% were British Black, 2.3% were British Asian, 3% were British Mixed-race, and 0.80% specified British Other. Forty-seven percent of non-athletes reported attempting to lose weight in the past 12 months, while 12% attempted to gain weight and 2.3% attempted to lose and gain weight in the past 12 months. Nearly 2% of non-athletes reported a past history of eating disorders, but none of the non-athletes reported a current eating disorder. The average number of times non-athletes have attempted to diet in the past 12 months was 1.03

(SD=2.11) and the average number of times they had dieted in over their lifetime was 5.88 (SD=16.97).

Measures

Demographic questionnaire. This questionnaire assessed the participants' age, gender, ethnicity, as well as the nature and extent of their athletic involvement. In addition to this, the demographic questionnaire assessed the participants' weight and diet history by enquiring about their current and past eating behaviours.

Eating Disorder Examination Questionnaire (EDEQ: Fairburn & Beglin, 2008). Previously employed amongst athletes (e.g., Hulley et al., 2007; Hulley & Hill, 2001; Pernick et al., 2006) and the general population e.g., (Carter et al., 2001; Luce et al., 2008), the EDEQ 6.0 was used to measure athletes' and non-athletes eating disordered psychopathology and behaviours. The EDEQ has been described in detail in the methodology section of this thesis (see Chapter 2). In the present study, the EDEQ scores were evaluated as both continuous and dichotomous variables. Specifically, to determine probable cases of clinical eating disorders, a cut off of ≥ 2.80 on the global EDEQ score was employed, as a score of 2.80 or higher on the global EDEQ score is said to hold high predictive validity of clinical eating disorders (see Mond et al., 2008). In the current sample, Cronbach's alpha scores were high, (Restraint=0.75 for elite athletes; 0.77 for developmental athletes; 0.75 for recreational athletes and 0.78 for non athletes; Eating Concern =0.78 for elite and developmental athletes; 0.82 for recreational athletes and 0.71 for non-athletes; Weight Concern= 0.84 for elite athletes; 0.83 for developmental athletes; 0.85 for recreational athletes; 0.83 for non-athletes and Shape Concern= 0.91 for elite, developmental and recreational athletes; 0.91 for non-athletes). The Cronbach's alpha score for the global EDEQ score was also high, recording 0.94 for elite, developmental, and recreational athletes, and 0.95 for non athletes.

Procedure

Once ethical approval was granted by the Institutional Ethics Review Board, NGBs, sport organisations (e.g., sport clubs), and Universities across the UK were contacted to discuss the nature of the study. Data collection was conducted in the following three ways (a) electronically (e.g., via email or online); (b) during lectures in several universities across

England, and (c) before a training session, whereby the athletes returned the completed informed consent form and the questionnaire pack the following week in a sealed envelope.

Table 3.1. Classification of the 64 sports into sport type and sport classification

	Individual sports		Team sports
100m	Cycling (E)	Kung fu	Basketball (B)
110m sprint hurdle	Decathlon (E)	Long jump	Bobsleigh
200m	Discus	Modern pentathlon (E)	Cricket (B)
400m	Diving	Mountaineering (E)	Football (B)
400m hurdles	Equestrian	Orienteering (E)	Handball (B)
800m (E)	Fencing	Pole vault	Hockey (B)
1500m(E)	Figure skating	Sailing	Lacrosse (B)
5k (E)	Golf	Skiing	Netball (B)
10k(E)	Gymnastics	Squash (B)	Rowing (E)
Archery	Hammer throw	Steeplechase (E)	Rugby (B)
Badminton (B)	Heptathlon (E)	Swimming (E)	Volleyball (B)
Biathlon (E)	High jump	Taekwondo	Waterpolo (B)
Bobskeleton	Javelin	Table tennis (B)	
Body building	Judo	Tennis (B)	
Boxing	Karate	Trampoline	
Canoe	Kayaking	Triathlon (E)	
Cross county (E)	Kickboxing	Triple jump	

Notes: E= Endurance sports; B=Ball sports

Data Analysis

With regards to sport classification, sports were categorised into endurance sports, power sports, ball games, technical sports, weight class sports, and aesthetic sports following the specification of Sundgot-Borgen and colleagues (see Sundgot-Borgen, 1993, 1994; Sundgot-Borgen & Larsen, 1993 for more details). However, due to the small number of athletes involved in power sports, technical sports, weight class sports, and aesthetic sports across all three performance standards, only distinctions between endurance and ball games

are reported in the current study (see Table 3.1). Subsequently, sports where athletes work together to obtain a specific objective (e.g., score points against each other), were categorised as team sports, while sports where an individual competes alone to obtain a specific outcome were categorised as individual sports. Descriptive and exploratory statistics (i.e., Ms, SDs, tests of normality) were first calculated, revealing that the data were not normally distributed. Accordingly, parametric analyses considered robust against such violations, and non-parametric analyses were used to examine mean differences on BMI, EDEQ subscales, and global EDEQ score. Thus, caution should be exercised when interpreting the results of the parametric tests. Specifically, Analysis of Variance (ANOVA) with Games Howell post hoc analyses was used to detect group (i.e., athletes v non-athletes) and gender differences between performance standards on BMI, the EDEQ subscales, and global EDEQ score. In instances where the homogeneity of variance was violated, the Welch F statistic has been reported. Analysis of covariance (ANCOVA) was employed to examine mean differences between elite, developmental, and recreational athletes competing in individual/team sports and endurance/ball sports, while controlling for the effect of gender. Post hoc analyses were conducted employing the Bonferroni correction, adjusting for the effect of gender. Chi Square tests were conducted to detect differences in the frequency of key eating disorder behaviours and prevalence estimates between athletes and non-athletes, as well as detecting gender and sport type differences *between* and *within* performance standards. Finally, Mann Whitney tests were used to detect gender and sport type differences on the EDEQ subscales and global EDEQ score *within* each performance standard (see Chapter 2 for more details). All hypotheses were tested at the $p < .05$ significance level, unless otherwise specified.

3.3. Results

Eating Disordered Psychopathology and Behaviours amongst British Athletes and British Non-Athletes

Table 3.2 displays the Ms and SDs of the BMI, EDEQ subscales, and the global EDEQ score of athletes and non-athletes. As shown by Table 3.2, there were clear differences in the BMI of elite, developmental, recreational, and non-athletes, with recreational athletes reporting a higher BMI than elite athletes and non-athletes ($p < .01$). The ANOVA further detected significant differences between elite, developmental, recreational and non-athletes on Restraint, Shape Concern, Weight Concern and global EDEQ score.

Table 3.2. Ms and SDs of BMI and EDEQ scores of elite, developmental, recreational, and non-athletes

Subscale	Elite athletes	Developmental athletes	Recreational athletes	Non athletes	ANOVA		Games Howell Post-Hoc
	(<i>n</i> =249)	(<i>n</i> = 505)	(<i>n</i> =191)	(<i>n</i> =129)	F	<i>p</i>	
BMI	22.15 (2.77)	22.60 (2.85)	23.26 (3.28)	22.31 (2.98)	5.54	<.01	RA>EA, NA
Restraint	1.15 (1.27)	0.90(1.16)	1.09 (1.24)	1.08 (1.25)	2.92 ⁺	<.05	EA>DA
Eating concern	0.50 (0.79)	0.43 (0.78)	0.58 (0.96)	0.52(0.77)	1.89	>.05	NS
Weight concern	0.95 (1.22)	0.95 (1.23)	1.27 (1.43)	1.24 (1.30)	4.08 ⁺	<.01	RA>DA
Shape concern	1.35 (1.41)	1.34 (1.39)	1.66 (1.55)	1.77 (1.49)	4.68 ⁺	<.01	NA>EA, DA
Global EDEQ score	0.99 (1.05)	0.90 (1.02)	1.15 (1.12)	1.15 (1.09)	3.53 ⁺	<.05	RA>DA

Notes; EA= elite athletes; DA; developmental athletes; RA; recreational athletes; NA= non-athletes

⁺ Welch F ratio is reported

Specifically, Games Howell post-hoc analyses revealed that elite athletes reported higher Restraint score than developmental athletes ($p < .05$), but there were no significant differences on Restraint between elite athletes, recreational athletes and non-athletes ($p > .05$).

Recreational athletes reported greater Weight Concern ($p < .01$) and global EDEQ score ($p < .05$) than developmental athletes, but there were no significant differences between elite athletes, recreational athletes, and non-athletes on these subscales ($p > .05$). Non-athletes reported greater Shape Concern than elite and developmental athletes ($p < .01$), but there was no significant difference between recreational athletes and non-athletes on Shape Concern ($p > .05$). Finally, no significant difference was found between elite athletes, developmental athletes, recreational athletes, and non-athletes on Eating Concern ($p > .05$).

Table 3.3 illustrates the proportion of British athletes and non-athletes engaging in key eating disordered behavioural features and pathogenic weight control methods at least on one occasion over the past 28 days. However, Chi square analyses found no significant differences between elite, developmental, recreational, and non-athletes in the engagement of key eating disordered behaviours ($\chi^2(3) \leq 6.34$, $p > .05$ in all cases).

Using the cut-off of ≥ 2.80 on the global EDEQ score (Mond et al., 2008), 6% of elite athletes ($n=15$), 5.9% of developmental athletes ($n=30$), 9.9% of recreational athletes ($n=19$), and 11.6% of non-athletes ($n=15$) were classified as potential cases with clinical eating disorders. However, a chi square test found no significant difference in the prevalence estimates between these groups ($\chi^2(3) = 7.47$, $p > .05$).

In summary, these analyses show that in general, developmental athletes reported the healthiest eating psychopathology scores, while recreational athletes and non-athletes reported more elevated eating psychopathology. However, there was no significant difference between elite, developmental, recreational athletes, and non-athletes in their participation in key eating disordered behaviours, suggesting that the proportion of athletes and non-athletes engaging in eating disordered behaviours are relatively similar. Finally, there was no significant difference in the prevalence rates of eating disorders between elite, developmental, recreational athletes, and non-athletes, suggesting that the prevalence of eating disorders does not differ significantly between these groups.

Table 3.3. Proportion of athletes and non-athletes reporting any engagement in key eating disordered behaviours

	Elite athletes (<i>n</i> =249) (%)	Developmental athletes (<i>n</i> =505) (%)	Recreational athletes (<i>n</i> =191) (%)	Non athletes (<i>n</i> =129) (%)
Binge Eating	134 (53.80)	279(55.20)	115 (60.20)	68 (52.70)
Objective Binge Episodes	38 (15.13)	71 (14.1)	35(18.3)	28 (21.70)
Self induced vomiting	12 (4.80)	14 (2.80)	7 (3.70)	3(2.30)
Laxative misuse	3 (1.20)	5 (1.00)	4 (2.10)	0 (0)
Excessive Exercise	66 (26.50)	180 (35.60)	63 (33.00)	42 (32.6)

Note: Engagement in the behaviours was calculated as 'on at least one occasion' over the past 28 days.

Eating Disordered Psychopathology and Behaviours of Males and Females *between* Performance Standards

Table 3.4 and 3.5 compare the Ms and SDs of the BMI, EDEQ subscales scores, and the global EDEQ score of male athletes and non-athletes (Table 3.4) and female athletes and non-athletes (Table 3.5). It is evident from Table 3.4 that there were no significant differences between elite, developmental, recreational male athletes, and male non-athletes on BMI, or any of the EDEQ subscales or the global EDEQ score ($p > .05$ in all cases). As shown in Table 3.5, there was no significant difference between elite, developmental, recreational female athletes, and female non-athletes on BMI and Eating Concern ($p > .05$), but there were significant differences on Restraint, Weight Concern, Shape Concern, and global EDEQ score. Specifically, Games Howell post-hoc analyses revealed that female non-athletes and female recreational athletes reported significantly higher Weight Concern than female developmental athletes ($p < .01$), while female non-athletes reported greater Shape Concern and global EDEQ score than developmental female athletes ($p < .01$ in both cases). Finally, while the ANOVA revealed a significant difference on Restraint between female athletes and non-athletes, the Games Howell post hoc test failed to detect any significant differences, although female non-athletes reported greater Restraint than developmental female athletes ($p = .06$).

Table 3.4. Ms and SDs of BMI and EDEQ scores of elite, developmental, recreational, and non-athlete males

Subscale	Elite males	Developmental males	Recreational males	Non athletes males	ANOVA		Games Howell
	(<i>n</i> =104)	(<i>n</i> = 238)	(<i>n</i> =98)	(<i>n</i> =46)	F	<i>p</i>	Post-Hoc
BMI	22.82 (2.89)	23.21 (2.73)	23.91 (3.15)	23.31 (3.10)	2.46	>.05	NS
Restraint	1.05 (1.21)	0.86(1.16)	1.00 (1.21)	0.61 (0.93)	1.84	>.05	NS
Eating concern	0.27 (0.50)	0.31 (0.67)	0.44 (0.77)	0.22 (0.48)	1.55 ⁺	>.05	NS
Weight concern	0.57 (0.85)	0.78 (1.11)	0.96 (1.22)	0.66 (0.97)	2.58 ⁺	>.05	NS
Shape concern	0.86 (1.10)	1.06 (1.22)	1.37 (1.50)	1.04 (1.06)	2.56 ⁺	>.05	NS
Global EDEQ score	0.69 (0.75)	0.75 (0.92)	0.94 (1.02)	0.63 (0.77)	1.75 ⁺	>.05	NS

Notes; EM= elite male athletes; DM; developmental male athletes; RM; recreational male athletes; NM= non-athletes males; NS= non-significant

⁺ Welch F ratio is reported.

Table 3.5. Means and SDs of BMI and EDEQ scores of elite, developmental, recreational, and non-athlete females

Subscale	Elite females	Developmental females	Recreational females	Non athletes females	ANOVA		Games Howell Post-Hoc
	(<i>n</i> =145)	(<i>n</i> = 267)	(<i>n</i> =93)	(<i>n</i> =83)	F	<i>p</i>	
BMI	21.67 (2.58)	22.06 (2.86)	22.57 (3.29)	21.75 (2.78)	2.13	>.05	N.S
Restraint	1.22 (1.31)	0.93(1.15)	1.18 (1.26)	1.34 (1.33)	3.27 ⁺	<.05	NS
Eating concern	0.66 (0.92)	0.53 (0.86)	0.73 (1.11)	0.69 (0.84)	1.61	>.05	NS
Weight concern	1.22 (1.37)	1.10 (1.31)	1.60 (1.56)	1.57 (1.35)	4.28 ⁺	<.01	NF>DF; RF>DF
Shape concern	1.70(1.50)	1.59 (1.49)	1.97 (1.54)	2.18 (1.55)	3.96	<.01	NF> DF
Global EDEQ score	1.20 (1.17)	1.04 (1.08)	1.37 (1.19)	1.44 (1.14)	3.85	<.01	NF> DF

Notes; EF= elite female athletes; DF; developmental female athletes; RF; recreational female athletes; NF= non-athletes females; NS=non-significant

⁺ Welch F ratio is reported.

Table 3.6. Proportion of male and female athletes and non-athletes engaging in key eating disordered behaviours

	Elite Males (n=104) (%)	Elite Females (n= 145) (%)	Developmental Males (n=238) (%)	Developmental Females (n= 267) (%)	Recreational Males (n=98) (%)	Recreational Females (n= 93) (%)	Non-athletes Males (n=46) (%)	Non-athlete Females (n= 83) (%)
Binge eating	57 (54.8)	77(53.1)	142(59.7)	137(51.3)	62(63.3)	53(57.0)	33 (71.7)	35(42.2)
OBE	11(10.6)	27(18.6)	26(10.9)	45(16.9)	16 (16.3)	19(20.4)	8 (17.4)	20(24.1)
Self-induced vomiting	2(1.9)	10(6.9)	6(2.5)	8(3.0)	4(4.1)	3(3.2)	0(0)	3(3.6)
Laxative misuse	1(1.00)	2(1.4)	3(1.3)	2(0.70)	1(1.0)	3(3.2)	0(0)	0(0)
Excessive Exercise	22(21.2)	44(30.3)	77(32.4)	103(38.6)	29(29.6)	34(36.6)	15 (32.6)	27(32.5)

Note: Engagement in the behaviours was calculated as 'on at least one occasion' over the past 28 days.

Table 3.6 illustrates the proportion of male and female athletes and their non-athletes counterparts engaging in key eating disordered behaviours over the past 28 days. Chi square analyses detected no differences in the frequency of male athletes and non-athletes ($\chi^2(3) \leq 4.64$, $p > .05$ in all cases), and female athletes and non-athletes ($\chi^2(3) \leq 4.76$, $p > .05$ in all cases) engaging in pathogenic behaviours.

Employing the diagnostic criteria, 1% of elite male athletes ($n=1$), 4.2% of developmental male athletes ($n=10$), 8.2% of recreational male athletes ($n=8$), and 2.2% of male non-athletes ($n=1$) were classified with possible clinical cases of eating disorders. However, the chi square revealed no significant difference in the prevalence estimates ($\chi^2(3) = 7.14$, $p > .05$). In the case of females, 9.7% of elite female athletes ($n=14$), 7.5% of developmental female athletes ($n=20$), 11.8% of recreational female athletes ($n=11$), and 16.9% of female non-athletes ($n=14$) were classified as potential cases with eating disorders. However, the prevalence rates were not found to differ significantly between the performance standards ($\chi^2(3) = 6.56$, $p > .05$).

In summary, the results suggest that in the case of males, there were no significant differences between elite, developmental, recreational, and non-athlete males on their eating psychopathology scores, on the prevalence of clinical cases of eating disorders or their engagement in pathogenic behaviours. In the case of females, while there were some notable significant differences on their eating psychopathology scores, there were no significant differences between elite, developmental, recreational, and non-athlete females on the prevalence of clinical cases of eating disorders or in engagement in pathogenic weight control behaviours.

Eating Disordered Psychopathology and Behaviours of Males and Females *within* Performance Standards

A series of one-tailed Mann Whitney tests detected significant gender differences on the EDEQ subscales and the global EDEQ score of males and females *within* each performance standard. At the elite standard, significant differences were detected on Eating Concern, Shape Concern, Weight Concern, and Global EDEQ Score ($U \leq 5506.000$, $Z \geq 3.63$, $p \leq .001$ in all cases), with elite female athletes reporting higher Eating Concern ($M_{\text{female}} = 0.66$, $SD_{\text{female}} = 0.92$; $M_{\text{male}} = 0.27$, $SD_{\text{male}} = 0.50$), Weight Concern ($M_{\text{female}} = 1.22$, $SD_{\text{female}} = 1.37$; $M_{\text{male}} = 0.57$, $SD_{\text{male}} = 0.85$), Shape Concern ($M_{\text{female}} = 1.70$, $SD_{\text{female}} = 1.50$; $M_{\text{male}} = 0.86$,

SD_{male}=1.10), and global EDEQ score ($M_{\text{female}}= 1.20$, $SD_{\text{female}}=1.17$; $M_{\text{male}}= 0.69$, $SD_{\text{male}}=0.75$) than male athletes. However, there was no significant difference between elite male and female athletes' scores on Restraint ($U=6705.000$, $Z=1.51$, $p>.05$). Similarly, at the developmental standard, significant group differences were detected on Eating concern, Shape Concern, Weight Concern, and Global EDEQ Score ($U\leq 26464.500$, $Z\geq 3.31$, $p\leq .001$ in all cases), with developmental female athletes reporting elevated Eating Concern ($M_{\text{female}}= 0.53$, $SD_{\text{female}}=0.86$; $M_{\text{male}}= 0.31$, $SD_{\text{male}}=0.67$), Weight Concern ($M_{\text{female}}= 1.10$, $SD_{\text{female}}=1.31$; $M_{\text{male}}= 0.78$, $SD_{\text{male}}=1.11$), Shape Concern ($M_{\text{female}}= 1.59$, $SD_{\text{female}}=1.49$; $M_{\text{male}}= 1.06$, $SD_{\text{male}}=1.22$) and global EDEQ score ($M_{\text{female}}= 1.04$, $SD_{\text{female}}=1.08$; $M_{\text{male}}= 0.75$, $SD_{\text{male}}=0.92$) when compared to male athletes. No significant group difference was detected on Restraint ($U=29527.500$, $Z= 1.40$, $p>.05$).

Significant gender differences were also detected at the recreational standard on Eating Concern, Weight Concern, Shape Concern, and global EDEQ score ($U\leq 3514.000$, $Z\geq 2.85$, $p\leq .001$ in all cases), with female athletes reporting higher Eating Concern ($M_{\text{female}}= 0.73$, $SD_{\text{female}}=1.11$; $M_{\text{male}}= 0.44$, $SD_{\text{male}}=0.77$), Weight Concern ($M_{\text{female}}= 1.60$, $SD_{\text{female}}=1.56$; $M_{\text{male}}= 0.96$, $SD_{\text{male}}=1.22$), Shape Concern ($M_{\text{female}}= 1.97$, $SD_{\text{female}}=1.54$; $M_{\text{male}}= 1.37$, $SD_{\text{male}}=1.50$) and global EDEQ score ($M_{\text{female}}= 1.37$, $SD_{\text{female}}=1.19$; $M_{\text{male}}= 0.94$, $SD_{\text{male}}=1.02$) than male athletes. No further gender differences were detected on Restraint ($U=4036.000$, $Z=1.39$, $p<.05$). Likewise, significant gender differences were also detected between males and females at the non-athlete standard on all the four EDEQ subscales and the global EDEQ score ($U\leq 1172.500$, $Z\geq 3.67$, $p\leq .001$ in all cases), with females reporting higher Restraint ($M_{\text{female}}= 1.34$, $SD_{\text{female}}=1.33$; $M_{\text{male}}= 0.61$, $SD_{\text{male}}=0.93$), Eating Concern ($M_{\text{female}}= 0.69$, $SD_{\text{female}}=0.84$; $M_{\text{male}}= 0.22$, $SD_{\text{male}}=0.48$), Weight Concern ($M_{\text{female}}= 1.57$, $SD_{\text{female}}=1.35$; $M_{\text{male}}= 0.66$, $SD_{\text{male}}=0.97$), Shape Concern ($M_{\text{female}}= 2.18$, $SD_{\text{female}}=1.55$; $M_{\text{male}}= 1.04$, $SD_{\text{male}}=1.06$), and global EDEQ scores ($M_{\text{female}}= 1.44$, $SD_{\text{female}}=1.14$; $M_{\text{male}}= 0.63$, $SD_{\text{male}}=0.77$).

Chi square tests were conducted to determine whether there was a significant difference in the engagement of pathogenic behaviours between males and females *within* each performance standard (see Table 3.6). Specifically, no significant differences were found on binge eating, OBEs, self-induced vomiting, laxative misuse, and excessive exercise between males and females at the elite standard ($\chi^2(1) \leq 3.27$, $p>.05$ in all cases), at the developmental standard, ($\chi^2(1) \leq 3.66$, $p>.05$ in all cases), nor at the recreational standard, (χ^2

(1) ≤ 1.13 , $p > .05$ in all cases). In non-athletes, the only significant difference found was between males and females on binge eating ($\chi^2(1) = 10.38$, $p < .01$), with a higher proportion of males (72%) engaging in binge eating than females (42%). No further differences were found between non-athlete males and females on OBEs, self-induced vomiting, laxative misuse, and excessive exercise ($\chi^2(1) \leq 1.70$, $p > .05$ in all cases).

Chi square tests were conducted to see whether there was a significant difference in the prevalence of potential cases of eating disorders between males and females within each performance standard. Specifically, the prevalence of potential clinical cases of eating disorders was significantly higher in females than males at the elite standard ($\chi^2(1) = 8.09$, $p < .01$) and in non-athletes ($\chi^2(1) = 6.22$, $p < .05$). However, the prevalence of potential clinical cases of eating disorders was not significantly different between males and females at the developmental ($\chi^2(1) = 2.44$, $p > .05$) and recreational standard ($\chi^2(1) = 0.72$, $p > .05$).

In summary, these results demonstrated that the female athletes and female non-athletes reported higher EDEQ scores than their male counterparts consistently within each performance standard. Moreover, in relation to pathogenic behaviours, a greater proportion of non-athlete males reported engaging in binge eating than female non-athletes. Finally, the prevalence of potential cases of eating disorders was higher in female elite athletes than male elite athletes and in female non-athletes than in male non-athletes, whereas at the developmental and recreational standard there was no significant difference in the number of eating disordered cases amongst males and females.

Eating Disordered Psychopathology and Behaviours of Endurance and Ball Sports Athletes *between* Performance Standards

While controlling for gender, no significant differences were detected between elite, developmental, and recreational athletes competing in endurance sports on Restraint ($F = 0.96$, $p > .05$), Eating Concern ($F = 1.43$, $p > .05$), Weight Concern, ($F = 2.68$, $p > .05$), Shape Concern ($F = 1.83$, $p > .05$), and the global EDEQ score ($F = 1.33$, $p > .05$), although recreational athletes involved in endurance sports reported higher scores (see Table 3.7). However, while controlling for gender, ($F = 13.87$, $p < .001$), a significant difference was found on BMI ($F = 11.35$, $p < .001$), with recreational athletes competing in endurance sports reporting a higher BMI ($M = 23.30$, $Se = 0.36$) than elite ($M = 21.86$, $Se = 0.28$) and developmental athletes ($M = 21.27$, $Se = 0.23$) competing in endurance sports. Similarly, while controlling for gender,

no significant differences were found on BMI, Restraint, Eating Concern, Shape Concern, and global EDEQ score ($F \leq 3.32$, $p > .05$ in all cases) between elite, developmental, and recreational athletes competing in ball sports, although recreational athletes reported higher scores than their elite and developmental counterparts (see Table 3.8). Correspondingly, controlling for gender, ($F = 20.97$, $p < .001$), a significant difference was found on Weight Concern ($F = 4.68$, $p < .01$), with recreational athletes competing in ball sports reporting greater Weight Concern ($M = 1.22$, $Se = 0.12$) than elite athletes competing in ball sports ($M = 0.67$, $Se = 0.15$).

Table 3.9 and 3.10 illustrates the proportion of male and female athletes competing in endurance and ball sports engaging in key eating disordered behaviours over the past 28 days. Chi square tests detected no differences in the frequency of behaviours reported between male athletes competing at the elite, developmental, and recreational standard in endurance sports ($\chi^2(2) \leq 4.41$, $p > .05$ in all cases) or ball sports ($\chi^2(2) \leq 1.86$, $p > .05$ in all cases). Similarly, the prevalence of engagement in key eating disordered behaviours between female athletes competing at the elite, developmental, and recreational standard in endurance sports ($\chi^2(2) \leq 3.09$, $p > .05$ in all cases) and ball sports ($\chi^2(2) \leq 4.70$, $p > .05$ in all cases) was also non-significant.

Using the cut-off of ≥ 2.80 on the global EDEQ score (Mond et al., 2008), 0% of elite male athletes involved in endurance sports, 7.5% ($n = 4$) of developmental male athletes involved in endurance sports, and 11.1% ($n = 2$) of recreational male athletes involved in endurance sports were classified as possible cases with clinical eating disorders, however the prevalence rates were not significantly different ($\chi^2(2) = 3.00$, $p > .05$). In the case of male athletes competing in ball sports, 0% of elite male athletes, 2.9% ($n = 4$) of developmental male athletes and 5.2% ($n = 3$), of recreational male athletes were classified as potential cases with clinical eating disorders, however again this was not statistically different ($\chi^2(2) = 1.27$, $p > .05$). Similarly, in relation to female athletes competing in endurance sports, 14.9% ($n = 7$) of elite female athletes, 10.3% ($n = 6$) of developmental female athletes, and 20.7% ($n = 6$) of recreational female athletes were classified as potential cases with clinical eating disorders, however the prevalence rates were not significantly different ($\chi^2(2) = 1.73$, $p > .05$). In the case of female athletes competing in ball sports, 4.3% ($n = 2$) of elite female athletes, 5.6% ($n = 8$) of developmental female athletes, and 9.1% ($n = 4$) of recreational female athletes were classified

Table 3.7. Ms and Ses of BMI and EDEQ scores of athletes competing in endurance sports

Subscale	Elite	Developmental	Recreational	ANCOVA		Bonferroni	Gender	
	endurance sports (<i>n</i> =77)	endurance sports (<i>n</i> = 111)	endurance sports (<i>n</i> =47)	F	<i>p</i>	correction Post hoc	F	<i>p</i>
BMI	21.86 (0.28)	21.27 (0.23)	23.30 (0.36)	11.35	<.001	RE>EE, DE	13.87	<.001
Restraint	1.39 (0.16)	1.10(0.13)	1.18 (0.20)	0.96	>.05	NS	2.00	>.05
Eating concern	0.55 (0.11)	0.53(0.01)	0.80 (0.14)	1.43	>.05	NS	9.27	<.01
Weight concern	1.04 (0.16)	1.06 (0.13)	1.58 (0.20)	2.68	>.05	NS	8.44	<.01
Shape concern	1.45(0.18)	1.43(0.15)	1.92(0.22)	1.83	>.05	NS	9.10	<.01
Global EDEQ score	1.11 (0.14)	1.03(0.11)	1.37(0.17)	1.33	>.05	NS	7.96	<.01

Notes: EE= Elite Endurance athletes; DE=Developmental Endurance athletes; RE= Recreational Elite athletes; NS= non-significant

Means adjusted for the effect of gender are reported.

Table 3.8. Ms and Ses of BMI and EDEQ scores of athletes competing in ball sports

Subscale	Elite	Developmental	Recreational	ANCOVA		Bonferroni	Gender	
	Ball sports (<i>n</i> =63)	ball sports (<i>n</i> =282)	ball sports (<i>n</i> =102)	F	<i>p</i>	correction Post hoc	F	<i>p</i>
BMI	22.95 (0.36)	23.22 (0.17)	23.39 (0.28)	0.46	>.05	NS	24.83	<.001
Restraint	0.81 (0.14)	0.85(0.07)	1.01 (0.11)	0.92	>.05	NS	0.47	>.05
Eating concern	0.34 (0.09)	0.37(0.04)	0.55 (0.07)	2.56	>.05	NS	12.15	<.01
Weight concern	0.67 (0.15)	0.91 (0.07)	1.22 (0.12)	4.68	<.01	RB>EB	20.97	<.001
Shape concern	1.14(0.17)	1.32(0.08)	1.60(0.13)	2.61	>.05	NS	21.43	<.001
Global EDEQ score	0.74 (0.12)	0.86(0.06)	1.09(0.09)	3.32	<.05	NS	15.62	<.001

Notes: EB= Elite Ball athletes; DB=Developmental Ball athletes; RB= Recreational Ball athletes; NS= non-significant

Means adjusted for the effect of gender are reported

as potential cases with clinical eating disorders, however again this was not statistically different ($\chi^2(2) = 1.04, p > .05$).

Eating Disordered Psychopathology and Behaviours of Endurance and Ball Sport Athletes *within* Performance Standards

A series of one-tailed Mann Whitney tests were subsequently conducted to detect significant sport classification differences in the EDEQ subscales and the global EDEQ score of male and female athletes competing in endurance and ball sports at the elite, developmental, and recreational standard. Specifically, no significant differences between male athletes involved in endurance sports and ball sports were detected on Restraint, Eating Concern, Weight Concern, Shape Concern, and global EDEQ score at the elite standard ($U \geq 183.000, Z \leq 1.34, p > .05$ in all cases), at the developmental standard ($U \geq 3177.500, Z \leq 1.61, p > .05$ in all cases), or at the recreational standard ($U \geq 479.000, Z \leq 0.54, p > .05$ in all cases). In relation to female athletes, a significant difference was detected on Restraint ($U = 840.000, Z = 2.02, p < .05$) at the elite standard, with female athletes engaged in endurance sports ($M = 1.58, SD = 1.61$) reporting greater restraint behaviours than those competing in ball sports ($M = 0.83, SD = 0.96$). No other significant differences were detected at the elite standard between female athletes competing in endurance and ball sports at the elite standard ($U \geq 913.000, Z \leq 1.48, p > .05$ in all cases). No significant differences between female athletes involved in endurance sports and ball sports were detected on Restraint, Eating Concern, Weight Concern, Shape Concern and global EDEQ score at the developmental standard ($U \geq 3962.000, Z \leq 0.50, p > .05$ in all cases), or at the recreational standard ($U \geq 495.000, Z \leq 1.63, p > .05$ in all cases).

Chi square tests were also conducted to see whether there was a significant difference in the prevalence of eating disorders and key eating disordered behaviours between male and female athletes competing in endurance sports and ball sports within each performance standard. Specifically, no significant differences were detected on the prevalence of eating disorder estimates, nor key eating disordered behaviours between elite male athletes competing in endurance and ball sports ($\chi^2(1) \leq 0.55, p > .05$ in all cases) and elite female athletes competing in endurance and ball sports ($\chi^2(1) \leq 3.07, p > .05$ in all cases). At the developmental standard, no significant differences were detected on the prevalence of eating disorder estimates, nor on the frequency of OBEs, self-induced vomiting, laxative use, and

Table 3.9. Proportion of male athletes competing in endurance and ball sports engaging in key eating disordered behaviours

	Elite Endurance (n=30) (%)	Elite Ball (n= 16) (%)	Developmental Endurance (n=53) (%)	Developmental Ball (n= 139) (%)	Recreational Endurance (n=18) (%)	Recreational Ball (n= 58) (%)
Binge eating	19 (63.3)	11(68.8)	26(49.1)	90(64.7)	11(61.1)	35(60.3)
OBE	4(13.3)	2(12.5)	7(13.2)	15(10.8)	1(5.6)	9(15.5)
Self-induced vomiting	0(0)	0(0)	3(5.7)	3(2.2)	0(0)	3(5.2)
Laxative misuse	1(3.3)	0(0)	2(3.8)	1(0.7)	0(0)	1(1.7)
Excessive Exercise	6(20.0)	4(25.0)	18(34.0)	45(32.4)	2(11.1)	17(29.3)

Note: Engagement in the behaviours was calculated as 'on at least one occasion' over the past 28 days.

Table 3.10. Proportion of female athletes competing in endurance and ball sports engaging in key eating disordered behaviours

	Elite Endurance (n=47) (%)	Elite Ball (n= 47) (%)	Developmental Endurance (n=58) (%)	Developmental Ball (n= 143) (%)	Recreational Endurance (n=29) (%)	Recreational Ball (n= 44) (%)
Binge eating	26 (55.3)	26(55.3)	26(44.8)	78(54.5)	13(44.8)	27(61.4)
OBE	10(21.3)	6(12.8)	8(13.8)	27(18.9)	7(24.1)	9(20.5)
Self-induced vomiting	3(6.4)	2(4.3)	1(1.7)	5(3.5)	0(0)	2(4.5)
Laxative misuse	2(4.3)	0(0)	1(1.7)	1(0.7)	1(3.4)	2(4.5)
Excessive Exercise	12(25.5)	14(29.8)	20(34.5)	59(41.3)	12(41.4)	17(38.6)

Note: Engagement in the behaviours was calculated as 'on at least one occasion' over the past 28 days.

excessive exercise between male athletes competing in endurance and ball sports ($\chi^2(1) < 2.33, p > .05$ in all cases). However, a significant difference was detected in the frequency of binge eating reported by developmental male athletes competing in endurance and ball sports ($\chi^2(1) = 3.95, p < .05$), with a higher proportion of male athletes competing in ball sports (64.7%) reporting engaging in binge eating on at least one occasion over the past 28 days than male athletes competing in endurance sports (49.1%). No significant differences were detected on the prevalence of eating disorders, or the frequency of key eating disordered behaviours between female athletes competing in endurance and ball sports at the developmental standard ($\chi^2(1) \leq 1.56, p > .05$ in all cases). At the recreational standard, no significant differences were detected on the prevalence of eating disorders, nor on the frequency of key eating disordered behaviours between male athletes competing in endurance and ball sports ($\chi^2(1) \leq 2.43, p > .05$ in all cases) or between female athletes competing in endurance and ball sports ($\chi^2(1) \leq 1.99, p > .05$ in all cases).

Collectively, these findings suggest that while there may be one or two notable significant differences between male and female athletes competing in endurance and ball sports, in general the prevalence of eating disorders and engagement in key eating disordered behaviours are consistent between elite, developmental, and recreational male and female athletes engaging in endurance and ball sports, as well as within each standard.

Eating Disordered Psychopathology and Behaviours of Individual and Team Sports Athletes *between* Performance Standards

As shown in Table 3.11, while controlling for the effect of gender, significant differences were detected between elite, developmental, and recreational athletes competing in individual sports on BMI ($F=6.38, p < .01$), Restraint ($F= 4.56, p < .01$), Weight Concern ($F=3.44, p < .05$), Shape Concern ($F=3.42, p < .05$), and global EDEQ score ($F=3.37, p < .05$). Specifically, recreational athletes engaging in individual sports reported a higher BMI ($M= 22.99, Se=0.28$) than their elite ($M=21.83, Se=0.21$), and developmental counterparts ($M=21.91, Se=0.18$). In addition, elite athletes competing in individual sports reported higher Restraint ($M=1.25, Se=0.09$) than developmental athletes competing in individual sports ($M=0.90, Se=0.08$), while recreational athletes competing in individual sports reported greater Weight Concern ($M=1.32, Se=0.13$), Shape Concern ($M=1.74, Se=0.14$) and global EDEQ score ($M=1.21, Se=0.11$), than developmental athletes competing in individual sports

($M_{\text{weightconcern}}=0.92$, $Se_{\text{weightconcern}}=0.08$; $M_{\text{shapeconcern}}=1.30$, $Se_{\text{shapeconcern}}=0.09$; $M_{\text{globalEDEQscore}}=0.89$, $Se_{\text{globalEDEQscore}}=0.07$). However, while controlling for gender ($F=15.76$, $p<.001$) there was no significant difference between elite, developmental and recreational athletes competing in individual sports on Eating Concern ($F=1.63$, $p>.05$).

As shown in Table 3.12, while controlling for the effect of gender, no significant differences were found between elite athletes, developmental athletes and recreational athletes competing in team sports on BMI ($F=0.11$, $p>.05$), Restraint ($F=0.64$, $p>.05$) and Eating Concern ($F=2.00$, $p>.05$). However, there was a significant difference on Weight Concern ($F=5.37$, $p<.01$), Shape Concern ($F=3.01$, $p<.05$), and global EDEQ score ($F=3.26$, $p<.05$) with athletes involved in team sports at the recreational standard reporting greater Weight Concern ($M=1.27$ $Se=0.13$), Shape Concern ($M=1.64$ $Se=0.14$) and global EDEQ score ($M=1.13$ $Se=0.10$) than elite athletes involved in team sports ($M_{\text{WeightConcern}}=0.64$ $Se_{\text{WeightConcern}}=0.15$; $M_{\text{ShapeConcern}}=1.11$, $Se_{\text{ShapeConcern}}=0.17$; $M_{\text{globalEDEQscore}}=0.74$ $Se_{\text{globalEDEQscore}}=0.12$).

Table 3.13 and 3.14 illustrates the proportion of male and female athletes competing in individual and team sports reporting any episodes of key eating disordered behaviours over the past 28 days. Chi Square tests detected no differences in the prevalence of behaviours between male athletes competing at the elite, developmental, and recreational standard competing in individual sports ($\chi^2(2) \leq 3.98$, $p>.05$ in all cases) and team sports ($\chi^2(2) \leq 2.43$, $p>.05$ in all cases). Similarly, the prevalence of female athletes in individual sports engaging in binge-eating, reporting OBES, laxative use, and excessive exercise across the elite, developmental and recreational standard was non-significant, ($\chi^2(2) \leq 2.83$, $p>.05$ in all cases). However, there was a significant difference on the frequency of female athletes involved in individual sports engaging in self-induced vomiting ($\chi^2(2) = 6.36$, $p <.05$). The follow up chi square performed at the $p<.02$ significance level, however, revealed no significant difference between elite and developmental female athletes, elite and recreational female athletes, developmental and recreational female athletes competing in individual sports on the frequency of self-induced vomiting ($\chi^2(1) \leq 5.17$, $p>.02$ in all cases). Finally, there was no significant difference in the frequency of female athletes competing in team sports engaging in any key eating disordered behaviours ($\chi^2(2) \leq 4.18$, $p>.05$ in all cases).

Table 3.11. Ms and Ses of BMI and EDEQ scores of athletes competing in individual sports

Subscale	Elite	Developmental	Recreational	ANCOVA		Bonferroni	Gender	
	Individual sports (<i>n</i> =180)	Individual sports (<i>n</i> = 257)	Individual sports (<i>n</i> =98)	F	<i>p</i>	correction Post hoc	F	<i>p</i>
BMI	21.83 (0.21)	21.91 (0.18)	22.99 (0.28)	6.38	<.01	RI>EI, DI	13.39	<.001
Restraint	1.25 (0.09)	0.90(0.08)	1.15 (0.13)	4.56	<.01	EI>DI	2.05	>.05
Eating concern	0.54 (0.06)	0.45(0.05)	0.62 (0.09)	1.63	>.05	NS	15.76	<.001
Weight concern	1.03 (0.10)	0.92 (0.08)	1.32 (0.13)	3.44	<.05	RI>DI	12.66	<.001
Shape concern	1.41(0.11)	1.30(0.09)	1.74(0.14)	3.42	<.05	RI>DI	25.00	<.001
Global EDEQ score	1.06 (0.08)	0.89(0.07)	1.21(0.11)	3.37	<.05	RI>DI	15.30	<.001

Notes: EI= Elite individual athletes; DI=Developmental Individual athletes; RI= Recreational Individual athletes

Means adjusted for the effect of gender are reported.

Table 3.12. Ms and Ses of BMI and EDEQ scores of athletes competing in team sports

Subscale	Elite	Developmental	Recreational	ANCOVA		Bonferroni	Gender	
	Team sports (<i>n</i> =69)	Team sports (<i>n</i> = 248)	Team sports (<i>n</i> =93)	F	<i>p</i>	correction Post hoc	F	<i>p</i>
BMI	23.22 (0.34)	23.31 (0.18)	23.43 (0.29)	0.11	>.05	NS	26.71	<.001
Restraint	0.87 (0.14)	0.90(0.07)	1.04 (0.12)	0.64	>.05	NS	0.52	>.05
Eating concern	0.35 (0.09)	0.40(0.05)	0.56 (0.08)	2.00	>.05	NS	12.47	<.001
Weight concern	0.64 (0.15)	0.98 (0.08)	1.27 (0.13)	5.37	<.01	RT>ET	25.97	<.001
Shape concern	1.11(0.17)	1.38(0.09)	1.64(0.14)	3.01	<.05	RT>ET	23.70	<.001
Global EDEQ score	0.74 (0.12)	0.92(0.06)	1.13(0.10)	3.26	<.05	RT>ET	17.62	<.001

Notes: ET= Elite Team athletes; DT=Developmental Team athletes; RT= Recreational Team athletes

Means adjusted for the effect of gender are reported.

Table 3.13. Proportion of male athletes competing in individual and team sports engaging in key eating disordered behaviours

	Elite Individual (n=81) (%)	Elite Team (n= 23) (%)	Developmental Individual (n=108) (%)	Developmental Team (n= 130) (%)	Recreational Individual (n=47) (%)	Recreational Team (n= 51) (%)
Binge eating	40 (49.4)	17(73.9)	56(51.9)	86(66.2)	31(66.0)	31(60.8)
OBE	8(9.9)	3(13.0)	12(11.1)	14(10.8)	8(17.0)	8(15.7)
Self-induced vomiting	2(2.5)	0(0)	3(2.8)	3(2.3)	1(2.1)	3(5.9)
Laxative misuse	1(1.2)	0(0)	2(1.9)	1(0.6)	1(2.1)	0(0)
Excessive Exercise	14(17.3)	8(34.8)	32(29.6)	45(34.6)	13(27.7)	16(31.4)

Note: Engagement in the behaviours was calculated as 'on at least one occasion' over the past 28 days.

Table 3.14. Proportion of female athletes competing in individual and team sports engaging in key eating disordered behaviours

	Elite Individual (n=99) (%)	Elite Team (n= 46) (%)	Developmental Individual (n=149) (%)	Developmental Team (n= 118) (%)	Recreational Individual (n=51) (%)	Recreational Team (n= 42) (%)
Binge eating	52 (52.5)	25(54.3)	73(49.0)	64(54.2)	28(54.9)	25(59.5)
OBE	21(21.2)	6(13.0)	20(13.4)	25(21.2)	10(19.6)	9(21.4)
Self-induced vomiting	8(8.1)	2(4.3)	3(2.0)	5(4.2)	1(2.0)	2(4.8)
Laxative misuse	2(2.0)	0(0.0)	1(0.70)	1(0.80)	1(2.0)	2(4.8)
Excessive Exercise	30(30.3)	14(30.4)	55(36.9)	48(40.7)	17(33.3)	17(40.5)

Note: Engagement in the behaviours was calculated as 'on at least one occasion' over the past 28 days.

Using the cut-off of ≥ 2.80 on the global EDEQ score (Mond et al., 2008), 1.2% (n=1) of elite male athletes involved in individual sports, 5.6% (n=6) of developmental male athletes involved in individual sports, and 10.6% (n=5) of recreational male athletes involved in individual sports were classified as potential cases of clinical eating disorders, however, there was no significant difference between these group of male athletes ($\chi^2(2) = 5.54$, $p > .05$). In the case of team sports, 0% elite male athletes involved in team sports, 3.1% (n=4) of developmental male athletes involved in team sports, and 5.9% (n=3) of recreational athletes involved in team sports were classified as potential cases of clinical eating disorders. Again these prevalence estimates were not statistically different ($\chi^2(2) = 1.79$, $p > .05$).

In relation to female athletes involved in individual sports, 12.1% (n=12) of elite female athletes, 7.4% (n=11) of developmental female athletes, and 13.7% (n=7) of recreational female athletes were classified as potential cases of clinical eating disorders, however, there was no significant difference between these groups of female athletes ($\chi^2(2) = 2.41$, $p > .05$). In the case of female athletes competing in team sports, 4.3% (n=2) elite female athletes, 7.6% (n=9) of developmental female athletes, and 9.5% (n=4) of recreational female athletes were classified as potential cases of clinical eating disorders. However, again these prevalence estimates were not statistically different ($\chi^2(2) = 0.92$, $p > .05$).

Eating Disordered Psychopathology and Behaviours of Individual and Team Sport Athletes *within* Performance Standards

A series of one-tailed Mann Whitney tests were conducted to detect significant sport type differences in the EDEQ subscales score of male and female athletes competing in individual and team sports *within* the elite, developmental, and recreational standard. Specifically, no significant differences between male athletes involved in individual sports and team sports were detected on Restraint, Eating Concern, Weight Concern, Shape Concern, and global EDEQ score at the elite standard ($U \geq 819.000$, $Z \leq 0.93$, $p > .05$ in all cases), at the developmental standard ($U \geq 6462.500$, $Z \leq 1.15$, $p > .05$ in all cases), and at the recreational standard ($U \geq 1026.000$, $Z \leq 1.23$, $p > .05$ in all cases). In relation to female athletes, a significant difference was detected on Restraint ($U = 1684.500$, $Z = 2.54$, $p < .01$), Eating Concern ($U = 1856.500$, $Z = 1.82$, $p < .05$), and global EDEQ score ($U = 1870.500$, $Z = 1.73$, $p < .05$) at the elite standard, with female athletes engaged in individual sports reporting greater Restraint ($M = 1.42$, $SD = 1.42$), Eating Concern ($M = 0.77$, $SD = 1.03$), and

global EDEQ score ($M=1.35$, $SD=1.28$) than female athletes engaged in team sports ($M_{\text{restraint}}=0.78$, $SD_{\text{restraint}}=0.92$; $M_{\text{eatingconcern}}=0.43$, $SD_{\text{eatingconcern}}=0.52$; $M_{\text{globalEDEQscore}}=0.87$, $SD_{\text{globalEDEQscore}}=0.80$). No other significant differences were detected at the elite standard between female athletes competing in individual and team sports ($U \geq 1909.000$, $Z \leq 1.57$, $p > .05$ in all cases). At the developmental standard, a significant difference was detected between female athletes competing in individual and team sports on Weight Concern ($U=7732.000$, $Z=1.71$, $p < .05$), with female athletes involved in team sports reporting greater Weight Concern ($M=1.27$, $SD=1.38$) than female athletes competing in individual sports ($M=0.97$, $SD=1.23$). No further significant differences between female athletes involved in individual and team sports were detected at the developmental standard ($U \geq 7864.500$, $Z \leq 1.48$, $p > .05$ in all cases) or at the recreational standard ($U \geq 1011.500$, $Z \leq 0.46$, $p > .05$ in all cases) on the EDEQ subscales.

Chi square tests detected a significant difference between male athletes competing in individual and team sports at the elite standard on the proportion of binge-eating reported ($\chi^2(1) = 4.35$, $p < .05$), with a higher proportion of male athletes competing in team sports (73.9%) reporting engaging in binge-eating on at least one occasion over the past month than male athletes competing in individual sports (49.4%). No further significant differences were detected on the prevalence estimates or on any other key eating disordered behaviours between elite male athletes competing in individual and team sports ($\chi^2(1) \leq 3.29$, $p > .05$ in all cases). Similarly, no significant differences were detected on the prevalence estimates and engagement in key eating disordered behaviours between female athletes competing in individual and team sports at the elite standard ($\chi^2(1) \leq 2.18$, $p > .05$ in all cases).

At the developmental standard, a significant difference was detected between male athletes competing in individual and team sports on the proportion of binge-eating reported ($\chi^2(1) = 5.01$, $p < .05$), with a higher proportion of male athletes competing in team sports (66.2%) reporting engaging in binge-eating on at least one occasion over the past month than male athletes competing in individual sports (51.9%). No further significant differences were detected on the prevalence estimates or on any other key eating disordered behaviours between developmental male athletes competing in individual and team sports ($\chi^2(1) \leq 0.90$, $p > .05$ in all cases). Similarly, no significant differences were detected on the prevalence estimates, and engagement in key eating disordered behaviours between female athletes competing in individual and team sports at the developmental standard ($\chi^2(1) \leq 2.83$, $p > .05$ in

all cases). Finally, at the recreational standard, no significant differences were detected on the prevalence estimates, nor the engagement in key eating disordered behaviours between male athletes ($\chi^2(1) \leq 1.10$, $p > .05$ in all cases) or female athletes ($\chi^2(1) \leq 0.58$, $p > .05$ in all cases) competing in individual and team sports.

Collectively, these findings suggest that there may be some notable differences between athletes competing in individual and team sports at the elite, developmental, and recreational standard, as well as within each performance standard in relation to eating psychopathology scores and engagement in key eating disordered behaviours. However, there are no significant differences in the prevalence estimates of eating disorders between male and female athletes participating in individual and team sports at elite, developmental, and recreational standard, nor within each performance standard. This suggests that competing in certain sports does not place athletes at increased risk for developing eating disorders.

3.4. Discussion

The present study sought to determine and compare the prevalence of eating disordered psychopathology amongst a large representative group of British male and female athletes competing at the elite, developmental, and recreational standard, and a control group of British male and female non-athletes. Contradicting the first hypothesis and previous research (e.g., Hausenblas & Carron, 1999; Smolak et al., 2000), British elite, developmental, and recreational athletes did not report higher eating disordered psychopathology than British non-athletes. Rather, the current findings revealed that non-athletes and recreational athletes reported greater concerns over their shape than elite and developmental athletes, while recreational and elite athletes reported greater weight concern and dietary restraint than developmental athletes, respectively. However, there was no significant difference in the prevalence of potential eating disorder cases between all four groups, although a higher frequency of non-athletes (11.6%) were classified as potential cases with eating disorders than elite, developmental, and recreational athletes. Furthermore there were no significant differences in the proportion of athletes and non-athletes engaging in compensatory weight control behaviours, although a higher number of elite athletes reported engaging in self-induced vomiting, a higher number of developmental athletes reported engaging in excessive

exercise and a higher proportion of recreational athletes reported engaging in binge eating and using laxatives than non-athletes.

Further inconsistent with the second prediction and current trend of findings (e.g., Hausenblas & Carron, 1999; Hausenblas & McNally, 2004; Levitt, 2008; Pritchard et al., 2007), developmental athletes did not report the highest eating disordered psychopathology, the highest prevalence of potential eating disorder cases or engagement in key eating disordered behaviours. Rather, the present results revealed that compared to elite, recreational, and non-athletes, developmental athletes appeared the healthiest, and expressed the lowest levels of eating disordered psychopathology. This is further collaborated with the fewer number of developmental athletes being classified as potential cases with eating disorders (5.9%) as well as a lower proportion of developmental athletes engaging in such behaviours as OBEs (14.10%), self-induced vomiting (2.8%) and laxative misuse (1%). However, a higher proportion of developmental athletes did report engaging in excessive exercise as a method of controlling their weight, but these differences were not statistically significant. Instead, the current findings indicate that between all the athletes, recreational athletes are at greater risk for developing eating disorders. This is further reinforced by the clear distinction in the eating psychopathology scores of athletes competing at elite, developmental and recreational standard and the higher number of recreational athletes classified with probable eating disorders (9.9%). Specifically, while developmental and elite athletes reported somewhat similar levels of eating disordered psychopathology, and similar prevalence rates, recreational athletes reported levels of eating disorder symptoms analogous to those of non-athletes.

Next, the present study sought to build upon previous prevalence literature by examining gender differences *between* and *within* performance standards. Inconsistent with the study hypothesis and prior research (e.g., Levitt, 2008), male and female athletes did not report higher eating disordered psychopathology than their non-athletic counterparts. Specifically, in relation to male athletes and non-athletes, there were no significant differences with regards to their eating disordered psychopathology, the prevalence of potential eating disorder cases and engagement in key eating disordered behaviours. However, recreational male athletes reported greater concerns about their eating, shape, and weight; as well as a higher proportion of recreational male athletes were classified as potential cases with eating disorders than elite, developmental, and non-athlete males. In

relation to females, while there were some significant differences with regards to eating psychopathology, with recreational and non-athlete females reporting greater concern about their weight, shape, and general eating psychopathology, there were no significant differences in the prevalence of probable cases of eating disorders and engagement in key eating disordered behaviours. But a higher proportion of non-athlete females and recreational athletes were classified as diagnosable cases with eating disorders.

Taken together, these findings suggest that competing in sports does not place males or females at increased risk of developing an eating disorder. This was not expected and contradicts previous research (e.g., Hausenblas & Carron, 1999; Sundgot-Borgen & Torstveit, 2004). In particular, Sundgot-Borgen and Torstveit found the prevalence of eating disorders to be higher in athletes (13.5%) than non-athletes (4.6%). However, these findings add to other research that has reported no significant differences in the prevalence of eating disorders amongst athletes and non-athletes (e.g., Coelho et al., 2010; Rosendahl et al., 2009), as well as research that has shown athletes to be at lower risk of developing eating disorders than non-athletes (e.g., Martinsen et al., 2010; Sanford-Martens et al., 2005). Moreover, in comparison to previous research, the prevalence of potential clinical eating disorders amongst the present sample of elite athletes is substantially lower than previously reported (i.e., Sundgot-Borgen & Torstveit, 2004). Specifically, Sundgot-Borgen and Torstveit reported a prevalence rate of 16% and 8% for female and male athletes respectively at the elite standard, whereas within the current sample only 9.7% of elite female athletes and 1% of elite male athletes were classified as potential cases with eating disorders. However, in contrast, the prevalence of eating disorders amongst the developmental level athletes appears to be higher than previously reported (e.g., Greenleaf et al., 2009; Petrie et al., 2008; Sanford-Martens et al., 2005). In particular, Sanford-Martens et al. reported a prevalence rate of 5.1% and 1.8% in their samples of female and male collegiate athletes respectively, whereas in the current sample, 7.5% of developmental female and 4.2% of developmental male athletes were classified with probable cases of eating disorders. This suggests that British developmental athletes may engage in more unhealthy eating practices than their counterparts in the US. However, it should be noted that such distinctions may also be due to the difference in the method and instruments employed to define athletes at risk for eating disorders, as well as the classification of athletes used in the current study (i.e., developmental is composed of university 1st team, county, regional, and club).

The next objective of the present study was to examine gender differences *within* each performance standard. In agreement with prior findings within the non-athletic population (e.g., Patton et al., 1999; Striegel-Moore, & Bulik, 2007) and the athletic population (e.g., Hausenblas & Carron, 1999; Johnson et al., 1999) as well as partially in line with the study hypothesis, the current study found that all female athletes and non-athletes reported higher eating disordered psychopathology than their male counterparts. In particular, all female athletes and non-athletes reported significantly greater concerns about their eating practices, shape, and weight than their male counterparts within each performance standard. There was no significant difference between elite, developmental, and recreational female athletes and male athletes on dietary restraint, but there was a significant difference between female non-athletes and male athletes on restraint, with female non-athletes reporting engaging in dietary restraint more frequently than male non-athletes. Moreover, a higher number of female athletes and non-athletes were classified with eating disorders than their male counterparts. However, this was only significant at the elite and non-athlete standard, suggesting that elite female athletes and female non-athletes are at greater risk of developing an eating disorder than their male counterparts, whereas the risk of developing eating disorders at the developmental and recreational standard seems equal for males and females. Similarly, a higher proportion of non-athlete males reported engaging in binge eating than non-athlete females which is consistent with previous findings (e.g., Anderson & Bulik, 2004; Lewinsohn et al., 2002).

The final aim of this study was to examine sport type differences *between* and *within* the three athletic performance standards, using the sport classification system as outlined by Sundgot-Borgen and colleagues (e.g., Sundgot-Borgen, 1993, 1994; Sundgot-Borgen & Larsen, 1993) and individual versus team sports. Contradicting the study hypothesis and recent line of research (e.g., Hausenblas & Carron, 1999; Hausenblas & McNally, 2004; Levitt, 2008; Pritchard et al., 2007) there was no significant difference between athletes competing in endurance sports or ball sports across the elite, developmental, and recreational performance standards in relation to eating psychopathology scores (apart from on weight concern, with recreational athletes engaged in ball sport reporting greater concern than their elite counterparts), the frequency of potential cases with clinical eating disorders and engagement in key eating disordered behaviours reported. Despite the non-significant results, it should be noted that recreational athletes competing in endurance and ball sports

reported greater disturbed eating psychopathology, as well as a higher proportion of male and female recreational athletes engaged in endurance and ball sports classified as potential cases with eating disorders than their elite and developmental counterparts. Providing some support to the next hypothesis (i.e., sport type differences within performance levels), a few notable significant differences were detected between male and female athletes competing in endurance and ball sports, but this was only evident at the elite and developmental standard, in relation to their eating psychopathology scores and engagement in pathogenic weight control behaviours such as binge eating. Specifically, at the elite standard, elite female athletes competing in endurance sports reported engaging in greater dietary restraint than their elite female counterparts competing in ball sports, while at the developmental standard, a higher proportion of male athletes engaged in ball sports reported episodes of binge eating than male athletes involved in endurance sports. However, there was no difference in the prevalence of clinical cases of eating disorders between both male and female athletes engaged in endurance and ball sports within each performance standard.

In relation to athletes competing in individual sports across the elite, developmental, and recreational standard, there was a significant difference on dietary restraint, weight concern, shape concern, and global EDEQ score. Specifically, elite athletes involved in individual sports reported more frequent engagement in dietary restraint than developmental athletes involved in individual sports, while recreational athletes engaged in individual sports reported greater concern about their weight and shape, as well as global EDEQ score than developmental athletes. However, there were no further significant differences on prevalence estimates of clinical cases of eating disorders or engagement in key eating disordered behaviours, although a higher proportion of recreational male and female athletes engaged in individual sports were classified as potential cases with eating disorders. Similar findings were detected relative to athletes competing in team sports. Specifically, notable significant differences were detected on eating psychopathology scores, with recreational athletes competing in team sports reporting greater concerns about their weight and shape than elite athletes. This finding is not surprising given that elite athletes are suggested to already have their optimal weight for performance and are more satisfied with their weight (Beals, 2004), whereas it is possible that athletes competing at the recreational standard are not, and may engage in team sports as a way of maintaining their weight or even potentially losing weight. However, there was no significant difference in the number of male and female athletes

classified with eating disorders, nor engagement in key eating disordered behaviours, although there was a trend for a higher number of recreational male and female athletes involved in ball sports to be classified with eating disorders. Providing some support to our final hypothesis, some notable sport type differences were detected between athletes competing in individual and team sports within performance standards. Specifically, at the elite standard, female athletes engaged in individual sports reported greater dietary restraint, greater concerns over their eating, and general eating psychopathology than their counterparts involved in team sports, while a higher proportion of elite male athletes involved in team sports reported engaging in binge eating than their respective counterparts involved in individual sports. Similarly, at the developmental level, female athletes involved in team sports reported greater concern about their weight than their respective counterparts involved in individual sports, while a higher number of male athletes involved in team sports reported engaging in binge eating than their respective counterpart involved in individual sports. No further significant differences were detected between male and female athletes engaged in team and individual sports in relation to eating psychopathology scores, prevalence estimates and engagement in any other key eating disordered behaviours. However, it should be noted that male and female athletes engaged in individual sports reported more disturbed eating psychopathology scores and a higher proportion of male and female athletes involved in individual sports were classified with eating disorders than male and female athletes engaged in team sports.

Despite the few noted significant sport type differences, collectively, the current findings suggest that the levels of eating disordered psychopathology, prevalence of eating disorders, and engagement in key eating disordered behaviours of both male and female athletes competing in endurance and ball sports, and in individual and team sports are relatively similar between the different performance standards, as well as within each performance standard. These between performance standards findings are novel, as no study to date has explored such a comparison. Subsequently, it is difficult to make any comparisons to past research, but the current findings suggest that all athletes (regardless of their performance standard and sport type) are at comparable risk of developing an eating disorder, but recreational male and female athletes (regardless of sport type) may be at heightened risk. The non-significant differences between athletes competing in endurance and ball sports within each performance standard on the other hand is in line with previous

research (e.g., Greenleaf et al., 2009; Petrie et al., 2008). Although the current findings provide support for previous findings, it should be highlighted that the sport type prevalence estimates of the current sample seem to be substantially lower than previously reported, suggesting that British athletes competing in endurance and ball sports engage in more healthy eating practices than their respective counterparts in other countries. For instance, Sundgot-Borgen and Torstveit reported that 9% of elite endurance male athletes and 5% of male athletes competing in ball sports were classified with a clinical eating disorder, whereas in the current sample no elite male athletes competing in endurance and ball sports were classified as potential cases with eating disorders. Sundgot-Borgen and Torstveit further reported that 19% and 12% of elite female athletes competing in endurance and ball sports respectively were classified with clinical eating disorders, whereas in the current sample only 14.9% and 4.3% of elite female competing in endurance and ball sports respectively were diagnosed as potential cases with eating disorders. Moreover, Petrie et al. reported that 12.8% and 20% of male collegiate athletes engaged in endurance and ball sport athletes were symptomatic of eating disorders, while in the current sample only 7.5% and 2.9% of developmental male athletes engaged in endurance and ball sport athletes were classified as potential cases with eating disorders. Similarly, Greenleaf et al. reported that 21.6% and 27.6% of collegiate female athletes engaged in endurance and ball sports respectively were symptomatic of clinical eating disorders, whilst in the current sample 10.3% and 5.6% of developmental female athletes competing in endurance and ball sports were classified with eating disorders. However, again this could be due to the difference in the method and instruments employed to define athletes at risk for eating disorders, as well as the classification of the sample in the current study.

In addition, the few noted significant sport type differences in terms of individual and team sports on the eating psychopathology scores detected at the elite performance standard are in line with the previous finding of Haase (2009), who reported that elite female athletes involved in individual sports demonstrated greater eating disturbances than their female counterparts competing in team sports. However, the finding that female athletes involved in team sports reported greater concern than female athletes involved in individual sports at the developmental standard is inconsistent with Haase's findings. Despite these noted differences in relation to eating psychopathology scores, collectively the current findings suggest that the prevalence of the eating disorders and key eating disordered behaviours of

athletes competing in individual and team sports are relatively similar across the different performance standards, as well as within each performance standard respectively. As this is the first study to examine the prevalence estimates of athletes competing in individual and team sports, no concrete assumptions can be made as to whether these prevalence rates are accurate, or whether similar prevalence rates would be found across other countries can be made.

Collectively, the current findings fuel the notion that increased competitive sport participation may serve as a protective barrier against the development of eating disorders (Coelho et al., 2010; Levitt, 2008; Martinsen et al., 2010), while engagement in sport at a recreational standard (regardless of sport type) or no participation in sport seems to enhance the vulnerability for eating disorders. However, it should be noted that such protection may only truly hold at the developmental standard, as in our sample, elite athletes reported slightly higher eating disordered psychopathology and behaviours than the developmental athletes. Thus it is possible that progression into national and international standard may faintly heighten athletes' risk of eating disorders once again. The findings further indicate that the relationship between athletic participation and eating psychopathology does not differ significantly for males and female, and that the risk of developing eating disorders is higher for both male and female recreational athletes (regardless of sport type) than other athletes. As such this should be further explored in future research. Although the reasons for this relationship were not examined, several reasons could be proposed. First, it is possible that recreational athletes became involved in sport as a method to lose weight or to control their weight (their BMI was higher than elite, developmental and non-athletes) therefore engagement in weight loss and weight controlling behaviours are higher. Second, it could be speculated that athletes competing at the more competitive levels may receive resources and support built into their training programmes (related to nutrition, dieting) that recreational athletes and the general population may not receive. Thus, it is possible that without the guidance of nutritionists and other resources, recreational athletes and non-athletes are not aware of the risks associated with engaging in eating disordered behaviours and lose understanding of the healthy eating practices, putting them at an increased risk for developing eating disorders or eating disordered behaviours. This can be further supported by the findings of Sundgot-Borgen (1994), who reported that athletes are more likely to engage in unhealthy practices if their dieting behaviours are unsupervised. Therefore, sport clubs,

coaches, and sport organisations need to ensure that the same provisions that are provided for the more competitive athletes, such as nutrition advice and access to dieticians and other support staff (e.g., sport psychologists, counsellors) are also readily available for recreational athletes. However, these are purely speculations and, as such, further prevalence studies are needed including recreational athletes in their sample.

Although it is tempting to conclude that competitive athletic participation may serve as a protective barrier, it should be noted that, on the other hand, the relationship between sport participation and compensatory behaviours may be more complex and not as clear-cut. Specifically, it seems that the preferred method of controlling weight amongst athletes is excessive exercise (for both male and female athletes, and more so for developmental athletes than others, regardless of sport type). The likelihood is that athletes are already exercising a sufficient number of hours per week (reported mean hours of training ranged from 5.27 - 13.19), thus exercising beyond their training regime (especially to burn off calories) is unhealthy and potentially dangerous as it may be a sign of exercise dependence (Veale, 1995), which has been linked to eating disorders (Pasman & Thompson, 1988). The current findings also underscore the fact that elite athletes (regardless of sport type) are more likely to engage in self-induced vomiting than other athletes and the general population. Given the physiological (e.g., dehydration, electrolyte imbalance) and psychological ramifications associated with engaging in such behaviour, as well as the effect it can have on an athlete's performance, this presents a cause for concern.

The current findings further illustrate some subtle gender and sport type differences in relation to behaviours to control their weight within each performance level. For example, although exercise is the preferred method for all male and female athletes, at the recreational standard it seems that female athletes are also more likely to use laxatives, while males are more likely to engage in self-induced vomiting. Conversely, at the developmental standard male athletes are more likely to use laxatives than female athletes, while at the elite standard female athletes are more likely to engage in self-induced vomiting than male athletes. Correspondingly, at the elite standard it appears that male and female athletes involved in endurance and individual sports are more likely to engage in self-induced vomiting and laxative misuse than those competing in ball and team sports, whereas at the recreational standard it appears that male and female athletes engaged in ball sports are more likely to engage in self-induced vomiting and laxative misuse than their respective counterparts

involved in endurance sports. However, at the developmental standard, male athletes engaging in endurance and individual sports are more likely to engage in self-induced vomiting and laxative use, while female athletes engaged in endurance sports are more likely to engage in laxative use, but female athletes engaged in ball and team sports are more likely to engage in self-induced vomiting. Finally, at the recreational standard, male athletes involved in team sports are more likely to engage in self-induced vomiting, while male athletes engaged in individual sports are more likely to misuse laxatives. On the other hand, recreational female athletes involved in team sports were more likely to engage in self-induced vomiting and laxative misuse than recreational female athletes involved in individual sports. Thus, athletic clubs, coaches and sport organisations need to be attuned to these subtle sport type differences that exist *between* and *within* each performance standard.

As the ability to identify potential risk groups is the first step in developing prevention and intervention programmes, it appears that primary intervention is required for non-athletes, and in particular female non-athletes, due to the high prevalence rate, while secondary intervention should be primarily targeted at the ‘at risk’ subgroups such as male and female recreational athletes (regardless of sport type) and elite female athletes (regardless of sport type). Moreover, given the subtle differences reported in the current study, any future prevention strategies and programmes should be tailored to accommodate the abovementioned unique differences *between* and *within* the performance standards, and designed specifically to reduce risks associated with the performance standard in question, rather than treating all athletes as one composite group. As failure to do so may result in certain subgroups of athletes being overlooked and not getting the specific help required for their eating problems

Despite the number of improvements made to this study to overcome the limitations of previous studies (e.g., large sample size, inclusion of male and females athletes engaged in a variety of sports) limitations exist, which warrant discussion. First and the most imperative limitation is the use of a self-report measure to assess eating disorders. Although self-report measures offer a number of advantages over the clinical interview (e.g., simple to administer and interpret results, cost effective, takes less time), this method has been previously criticised as it may provide less accurate data (Sundgot-Borgen, 1993). Nevertheless, the present study utilised a questionnaire that is not only derived from the ‘gold standard’ assessment of eating disorders, Eating Disorder Examination (EDE), but has well-established

psychometric properties (Mond et al., 2006) and is considered to fare better than most self-report instruments in identifying clinically diagnosable eating disorders within community samples (Mond et al., 2004). Moreover, previous research has noted a close agreement between the EDEQ and the EDE with respect to the assessment of the frequency of compensatory behaviours and eating disordered attitudes (Fairburn & Beglin, 1994; Mond et al., 2004). The second limitation that warrants discussion is the extent to which the sampling bias may have influenced the final results. In particular, the classification of recreational athletes, and the classification of sports into sport types. Athletes who participated in sport for university 2nd team and below were classified as recreational athletes in the current study. However, this could have potentially inflated the prevalence rates of the recreational standard athletes, as those that engage in sport at this level may not be engaging in sport for recreational purposes. Rather, it is possible that they may classify themselves as competitive athletes as they train frequently and compete in games and matches every week.

In addition, despite the study's considerable recruitment efforts, there was a poor response rate from elite and recreational athletes competing in power sports (e.g., sprinting), technical sports (e.g., sailing), aesthetic sports (e.g., gymnastics) and weight class sports (e.g., judo). Therefore, it would have been inappropriate to conduct such analyses comparing these sports. Thus, it is possible that although there may not have been any significant differences in the prevalence of eating disorders between athletes competing in endurance and ball sports, there may have been between ball sports and aesthetic sports or between weight-class and ball sports, as reported by Sundgot-Borgen and Torstveit (2004). Correspondingly, in terms of classifying sports into individual and team sports, there were some sports which could be categorised as both individual and team sports (e.g., rowing, badminton, sailing), however these sports were classified accordingly to individual or team sports. Thus, it is possible that by including these athletes in the study, the true differences in prevalence estimates were hidden. Therefore, future studies should seek to replicate and extend this study by building upon these limitations, and employ a two-stage procedure of initial screening with the EDEQ and clinical diagnosis with a larger representative sample, and examining sport type differences for male and female athletes across the various performance standards. This would not only allow more accurate information as to the size and the nature of eating problems within the athletic domain, but also can serve as a guide for treatment and prevention for practitioners and health professionals working closely with athletes.

3.5. Conclusion

The current study has extended upon the limited prevalence literature available on British athletes, as well as providing preliminary insight into the gender and sport type differences that exists on eating psychopathology *between* and *within* performance standards. Specifically, the current findings have demonstrated that the prevalence of eating disorders in elite and developmental athletes are relatively lower than British non-athletes, further fuelling the notion that increased competitive sport participation acts as a protective barrier against the development of disturbed eating attitudes, while engagement in sport at recreational (regardless of gender or sport type)/non-competitive levels seem to enhance the vulnerability to eating disorders. Given the subtle gender and sport type differences found between athletes *between* performance standards and *within* each performance standard, it is desirable that future strategies and interventions geared towards athletes accommodate these differences, which may in turn result in such strategies and interventions being more effective in preventing, and managing the disorder.

STUDY 2 and 3

The Association between Interpersonal Difficulties and Eating Psychopathology amongst British Athletes

Interpersonal problems have been linked to eating disorders since the earliest conceptualisation of the disorder (e.g., Bruch, 1973; Gull, 1874). However, the literature examining the link between interpersonal difficulties and eating psychopathology amongst athletes is limited. Thus, guided by the psychosocial processes highlighted to play a role in both the onset and maintenance of eating disorders by Fairburn et al. (2003), the central focus of this section was to examine the association between situational interpersonal difficulties (i.e., relationship quality with significant others), dispositional interpersonal difficulties (i.e., enduring, internal, trait-like interpersonal problems) and athletes' eating psychopathology.

Study 2 examined the association between situational interpersonal difficulties as captured by athletes' current perception of the quality of their relationship (in terms of social support and interpersonal conflict) with significant others (i.e., parents, teammates, and coaches) and eating psychopathology (Chapter 4), as well as between dispositional interpersonal difficulties as captured by athletes' attachment styles (i.e., an enduring trait that characterises individuals' attachment style relative to relating with other people) and eating psychopathology (see Chapter 5)¹. As previous studies have tended to concentrate on a single pathway between relationship quality, attachment styles, and eating attitudes (see Jones et al., 2006; O'Kearney, 1996), this study extends on the current literature by examining a multiple pathway between these interpersonal difficulties and eating psychopathology. Specifically, this study examined the mediating effects of clinical perfectionism (measured by both personal standards and self-critical instruments), self-esteem, and depression in such association.

Guided by the findings of Study 2, Study 3 (Chapter 6) further examined the association between situational and dispositional interpersonal difficulties and eating psychopathology amongst athletes, and a control group of non-athletes. Specifically, this study examined the association between situational interpersonal difficulties as reflected in relationship quality (in terms of autonomy support and involvement) with the mother, father,

¹ The study contained in this chapter has been accepted for publication: Shanmugam, V., Jowett, S., & Meyer, C. (2012). Eating psychopathology amongst athletes: Links to current attachment styles. *Eating Behaviors*, doi:10.1016/j.eatbeh.2011.09.004

and coach (athletes only), dispositional interpersonal difficulties as captured by social anxiety and loneliness and eating psychopathology. This was based on the premise that often the father-child relationship is overlooked in the context of eating disorders (see Jones et al., 2006; Meyer & Gillings, 2004). This study also examined whether a specific type of interpersonal difficulties (i.e., situational or dispositional interpersonal difficulties), was a better independent predictor of eating psychopathology among athletes and non-athletes. Finally, Study 3 examined the mediating effects of self-critical perfectionism, self-esteem, and depression in such associations for both athletes and non-athletes.

4

Eating Psychopathology amongst Athletes: The Importance of Relationships with Parents, Coaches and Teammates

Abstract

Objective: The aims of the study were two-fold. First, it aimed to determine the association between the quality of significant interpersonal relationships and eating psychopathology amongst a sample of athletes. Second, it examined the mediating role of self-esteem, clinical perfectionism, and depression in such association. **Method:** Four hundred and eleven British athletes completed self-report instruments pertaining to eating psychopathology, negative and positive aspects of the quality of relationships with parents, coaches, and closest teammate, self-esteem, depression, and perfectionism. **Results:** Significant associations were found between the quality of the parent-athlete, coach-athlete relationships and eating psychopathology. Specifically, parental and coach-athlete relationships characterised by increased conflict, and decreased support were indirectly related to increased eating psychopathology, through low self-esteem, increased self-critical perfectionism, and depression. Relationship quality with teammates was not associated with athletes' eating psychopathology. **Conclusion:** The present findings provide evidence to suggest that current relationship dynamics with parents and coaches influences athletes' eating psychopathology indirectly through self-esteem, self-critical perfectionism, and depression.

4.1. Eating Psychopathology amongst Athletes: The Importance of Relationships with Parents, Coaches, and Teammates

There is a well-established link between problematic relationships and eating psychopathology (see Fairburn et al., 2003; Jacobi, Hayward et al., 2004; McIntosh et al., 2000). For example, familial relationships that are overly protective, enmeshed, and lacking in conflict resolution are reported among eating disordered patients (e.g., Bruch, 1973; Minuchin et al., 1978). Similarly, eating disordered women report poor relationship quality with significant others such as romantic and martial partners (Boyes et al., 2007), close

friends (Gerner & Wilson, 2005; Schutz & Paxton, 2007), and siblings (Lehoux & Howe, 2007; Murphy et al., 2000). Moreover, a number of studies have highlighted the dysfunctional relations with parents, and significant others as predictive of unhealthy eating attitudes and behaviours (see Johnson, Cohen, Kasen et al., 2002; May et al., 2006; Stice et al., 2002).

Within the athletic domain, research examining the links between eating psychopathology and relationship functioning is relatively scarce. Much of the previous research has focused on studies identifying sport-specific risk factors such as injury and the sporting environment (e.g., Hulley et al., 2007; Sundgot-Borgen, 1994). However, there is a small body of research implicating interpersonal factors in problematic eating. These factors include the coach-athlete relationship and coach interpersonal behaviours (e.g., Biesecker & Martz, 1999; Jones et al., 2005; Muscat & Long, 2008; Thompson & Sherman, 1999b) and teammate-athlete relationships (e.g., Rosen et al., 1986; Williamson et al., 1995). In particular, coach-athlete relationships characterised by increased conflict, power struggles, and lack of support (Jones et al., 2005), a coach who maintains an autocratic coaching style (Biesecker & Martz, 1999), as well as a coach who implements continuous monitoring and teasing of athletes' weight and eating practices (Muscat & Long, 2008) are all inadvertently associated with athletes reporting increased eating psychopathology. Similarly, teammates are thought to influence disordered eating through social pressure regarding body weight and size (Williamson et al., 1995), and encouragement to engage in pathological weight control methods such as the use of laxatives, diet pills, or self-induced vomiting (Rosen et al., 1986).

The findings of the aforementioned studies provide a limited and narrow understanding of the association between relationship difficulties and eating psychopathology, due to their focus on the dynamics of one specific relationship dyad (e.g., coach-athlete or teammate-athlete relationship), rather than examining the influence of multiple relationship dyads concurrently. Moreover, the manner in which relationship quality has been operationalised has been extensively varied. Although it is widely accepted that within an athletes' social environment the coach is important and crucial to athletic development and wellbeing (e.g., Jowett & Cockerill, 2003; McAuley, 1996; Wylleman & Lavallee, 2004), several studies have demonstrated that parents and teammates also play an important role in shaping athletes' athletic experiences (Holt et al., 2008; Smith, 2007), athletic development (Wuerth et al., 2004) and wellbeing (Gould, Tuffey et al., 1996; Gould,

Udry et al., 1996; Jowett & Cramer, 2010). As such, only one study to date has simultaneously examined the influence of the quality of multiple social relationships (coaches, parents, sport friends/peers) on disturbed eating attitudes amongst athletes (Scoffier et al., 2010). Scoffier et al. reported that the quality of the parent-athlete relationship, and peer acceptance was directly related to athletes' disturbed eating attitudes, whereas the quality of the coach-athlete relationship, and sport friendship influenced disturbed eating attitudes indirectly through perceived physical ability.

While it is important to consider the relative importance of the various significant relationships, it is also important to begin to understand the mediators of the link between relationship functioning and eating psychopathology among athletes, given the crucial role these relationships play, particularly during an athlete's competitive career (Wylleman et al., 2007). Consequently, Fairburn et al. (2003) highlighted three potentially important mediating variables; self-esteem, clinical perfectionism, and depression in the link between interpersonal difficulties and eating psychopathology. Accordingly, in previous research, each of these factors has also been shown to be independently related to both disordered eating (e.g., Bardone-Cone et al., 2007; Button et al., 1997; Stice & Bearman, 2001) and dysfunctional relationships with significant others (e.g., Haring, Hewitt, & Flett, 2003; Thomas & Daubman, 2001; Waldringer, Vaillant, & Orav, 2007), and are therefore potentially important candidates as mediators. The examination of these three mediators collectively could not only be key to understanding how eating psychopathology is associated to relationship functioning (e.g., whether relationship quality is directly or indirectly related to eating psychopathology), but the comparison of the relative strengths of self-esteem, depression, and clinical perfectionism as potential mediators in such association will help identify the most salient mediator(s), which will provide potentially useful targets for intervention.

In summary, relationship difficulties are associated with disturbed eating psychopathology among non-clinical, clinical, and athlete samples. However, among athletes, the relative importance of key relationships in relation to eating psychopathology remains unclear. In addition, there is limited knowledge about the potential mediators of such association between relationship difficulties and eating attitudes and behaviours both in sport, and in the general population. Therefore, this study had two aims. First, it aimed to determine the association between the quality of athletes' relationship with parents, coaches,

teammates and their levels of eating psychopathology. In keeping with the literature, it was predicted that athletes who report poor quality relationships would report increased eating psychopathology. In addition, the study examined whether any specific relationship would be more synonymous with elevated eating psychopathology. Given that within an athlete's inner circle, the coach is viewed as more important and crucial to their athletic development and wellbeing than any other person (see Jowett & Cockerill, 2003; McAuley, 1996; Wylleman & Lavallee, 2004) it was hypothesised that only a poor quality coach-athlete relationship would be significantly related to elevated eating psychopathology. Finally, the study examined the mediating roles of self-esteem, clinical perfectionism, and depression in the link between relationship functioning and eating psychopathology. Due to limited previous research, no priori hypotheses were postulated as to which of these processes would have the greatest mediating effect.

4.2. Method

Participants

Recruited as part of a larger study examining the prevalence and psychosocial correlates of eating psychopathology amongst athletes, the current sample consisted of 411 (159 males and 252 females) British athletes. The athletes had a mean age of 20.95 years ($SD=3.67$, range 16-36) and a BMI of 22.72 ($SD=3.16$). Thirty-three percent ($n=136$) of athletes competed at the elite standard (international or national standard), while the remaining 67% ($n=275$) competed at the county, regional, club, or university level. Eighty-eight percent of the athletes were British White, 3.9% were British Black, 4.4% were British Asian, 2.4% were Mixed-race and 1% specified British Other. Athletes represented a range of sports, with 53% of athletes engaging in individual sports (e.g., cycling, swimming, equestrian, judo, and triathlon), while the remaining 47% of athletes competed in team sports (e.g., cricket, rugby, basketball, football, and hockey). Athletes had been participating in their chosen sport for an average of 8.66 years ($SD = 5.15$) and trained an average of 8.79 hours ($SD = 5.66$) per week. Athletes had been training with their respective coaches for an average of 2.77 years ($SD = 3.95$), of which 81% of athletes identified their coach as male, and 19% identified their coach as female. Athletes had been training with their current teammate for an average of 2.89 years ($SD = 3.04$), of which 45% of athletes identified as male, and 55% as a female teammate. Athletes spent an average of 5.93 ($SD =5.01$) and

6.35 (SD = 6.29) hours per week training with their coach and teammates, respectively. Finally, nearly 56% of the athletes selected their mother as the most influential parent on their athletic career, whereas the remaining 44% selected their father.

Measures

The following section provides a brief overview of the measures used in this study; for a more detailed outline of these measures, the reader is referred to Chapter 2 of this thesis.

Demographic questionnaire. This questionnaire assessed the athletes' age, gender, ethnicity, as well as the nature and extent of their athletic involvement.

Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 2008). For the purpose of the current study, only the global EDEQ score was used, which is the composite mean of the four subscales (eating concern, shape concern, weight concern, and restraint), with higher scores indicating greater levels of eating psychopathology. The EDEQ exhibited excellent internal consistency, recording 0.94 with the current sample.

Sport-Specific Quality of Relationship Inventory (S-SQRI; Jowett, 2009). Only the subscales of social support and interpersonal conflict of the S-SQRI were used for the purpose of this study. In the case of the parent version of the S-SQRI, participants were asked to respond to the statements in relation to the parent who has had the most prominent influence in their sport. Similarly, in the case of the teammate, participants were asked to respond to the statements in relation to their closest teammate on their team/squad. Scores are derived from averaging the sum of scores for each subscale, with higher scores reflecting higher levels of support and conflict in the relationship. In this sample, Cronbach's alpha scores for athletes' perceptions of relationship quality with their chosen parent were as follows: support (S-SQRI-PS) $\alpha = 0.82$ and conflict (S-SQRI-PC) $\alpha = 0.87$. Cronbach's alpha scores for athletes' perceptions of relationship quality with their coach were as follows: support (S-SQRI-CS) $\alpha = 0.85$; and conflict (S-SQRI-CC) $\alpha = 0.88$. Finally, Cronbach's alpha scores for athletes' perceptions of relationship quality with their teammate were as follows: support (S-SQRI-TS) $\alpha = 0.90$ and conflict (S-SQRI-TC) $\alpha = 0.87$.

Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990). Complying with the assertion of Shafran et al. (2002) that the seven item FMPS personal standards subscale is the '*closest to the clinical concept of perfectionism*' (p.777) related to

eating disorders, only this subscale of the FMPS was used for the present study. Scores are derived from the sum of scores, with higher scores reflecting greater levels of perfectionism. Cronbach's alpha score of 0.83 was recorded for athletes' levels of personal standards (FMPS-PS).

Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978). For the purpose of the present study, only the 15-item self-criticism subscale (DAS-SC) was used. Scores are derived from the sum of scores, with higher scores reflecting greater levels of self-critical perfectionism. Cronbach's alpha score of 0.92 was recorded for athletes' levels of self-criticism.

Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965). The 10-item RSES was used to measure participants' levels of self-esteem. Scores are derived from the sum of scores, with higher scores reflecting greater levels of self-esteem. Cronbach's alpha of 0.87 was recorded for this sample of athletes.

Symptom Checklist 90R (SCL-90; Derogatis, 1983). For the purpose of this study only the depression subscale² was used (SCL-Depression). Scores are derived from averaging the sum of scores, with higher scores reflecting higher levels of depressive symptoms. Cronbach's alpha of 0.88 was recorded with this sample.

Procedure

Following ethical clearance, data were collected via contacts made with NGBs, sport organisations (e.g., sport clubs), and universities. The data were collected either electronically (via email or a secure webpage); via distribution prior to a specific training session (and returned in a sealed envelope the following week), or via distribution during University lectures.

Data Analysis

The data were not normally distributed. Therefore, non-parametric tests were employed wherever possible. Preliminary analyses revealed significant gender differences in athletes' global EDEQ score ($U=14029.500$, $Z= 5.12$, $p <.001$), with female athletes

² The depression subscale is composed of 13 items, but one item related to sexual pleasure was removed from the present study as it was deemed inappropriate for the purpose of this study.

($M=1.30$, $SD=1.22$) reporting a more elevated global EDEQ score than male athletes ($M=0.70$, $SD=0.76$), thus gender was used as a covariate for all mediation analyses. The data were subsequently analysed in the following ways. First, to determine any associations between S-SQRI, FMPS-PS, DAS-SC, RSES, SCL-Depression, and global EDEQ score, one tailed Spearman Rho correlations were used. Second, to test the mediating effect of FMPS-PS, DAS-SC, SCL-Depression, and RSES scores in the association between S-SQRI and global EDEQ score, four sets of the bootstrapping multiple mediation analyses were used (e.g., Hayes, 2009; Preacher & Hayes, 2004, 2008). This procedure consists of simultaneously estimating the effect of the IVs on the proposed mediators; estimating the proposed mediators on the DV, while controlling for the IVs; calculating the indirect effects of the IVs on the DV through the proposed mediators; and bootstrapping the indirect effects and deriving a confidence interval (see Chapter 2 for more details). All meditational analyses were conducted using a macro for SPSS designed to assess indirect effects of multiple mediators on SPSS 17 (Preacher & Hayes, 2008).

4.3. Results

Descriptive Statistics

Table 4.1 presents the means (Ms), standard deviations (SDs), and results from the Spearman Rho used to assess the associations between athletes' perception of their relationship with parents, coaches, teammates, personal standard perfectionism, self-critical perfectionism, self-esteem, depression, and eating psychopathology. It is clear from Table 4.1 that athletes' global EDEQ score was considerably lower than the community norms previously reported (e.g., Fairburn & Beglin, 1994; Mond et al., 2006), as well as the previous means provided on athletes (e.g., Pernick et al., 2006). This suggests that the athletes in the current study reported relatively healthy eating psychopathology. However, the lower EDEQ score is probably a reflection of the inclusion of male and female athletes in the present study, whereas the aforementioned previous studies have primarily used the EDEQ with females. The current sample of athletes' scores on the S-SQRI was also comparable with the previous study of Jowett and Cramer (2010). In particular, the current sample of athletes reported relatively similar scores on coach support and coach conflict. However, the current sample reported lower levels of parental conflict and higher levels of

Table 4.1. Ms, SDs, and Spearman Rho correlations between EDEQ, S-SQRI-Parent, S-SQRI-Coach, S-SQRI-Teammate, FMPS-PS, DAS-Self-Criticism, RSES, and SCL-Depression scores

Variables	Ms	SDs	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. S-SQRI-PS	3.14	0.65	1.0	-.38**	.12**	.07	.18**	-.06	.04	-.20**	.17**	-.07	-.11*
2. S-SQRI-PC	1.75	0.61	-	1.0	.08	.11*	-.04	.19**	.10*	.24**	-.20**	.18**	.17**
3. S-SQRI-CS	2.39	0.69	-	-	1.0	-.17**	.22**	-.02	.13**	-.08*	.12**	-.13**	-.13**
4. S-SRI-CC	1.55	0.59	-	-	-	1.0	.04	.26**	.16**	.22**	-.20**	.23**	.12**
5. S-SQRI-TS	3.12	0.73	-	-	-	-	1.0	-.15**	-.02	-.07	-.03	.09*	-.02
6. S-SQRI-TC	1.39	0.50	-	-	-	-	-	1.0	.00	.24**	-.14**	.08*	.08
7. FMPS-PS	26.87	4.54	-	-	-	-	-	-	1.0	.28**	.04	.08	.06
8. DAS-SC	44.39	15.96	-	-	-	-	-	-	-	1.0	-.40**	.37**	.35**
9. RSES	20.56	4.64	-	-	-	-	-	-	-	-	1.0	-.52**	-.41**
10. SCL-DEP	0.93	0.68	-	-	-	-	-	-	-	-	-	1.0	.47**
11. EDEQ	1.07	1.11	-	-	-	-	-	-	-	-	-	-	1.0

Note: * $p < .05$, ** $p < .01$, one tailed. S-SQRI-PS= parental support, S-SQRI-PC= parental conflict, S-SQRI-CS= coach support, S-SQRI-CC=coach conflict, S-SQRI-TS= teammate support, S-SQRI-TC=teammate conflict FMPS-PS=personal standards perfectionism, DAS-SC= self-critical perfectionism, RSES=self-esteem, SCL-Depression=depression, EDEQ= eating psychopathology

parental support. Finally, athletes' scores on the other measures; FMPS-PS, DAS-SC, RSES, and SCL-Depression were also in line with previous reports with non-clinical samples (e.g., Dunkley & Kyparissis, 2008; Gilbert & Meyer, 2005a; Jowett & Cramer, 2009; Taranis & Meyer, 2010), although the current sample reported lower depressive symptoms and higher levels of perfectionism (both personal standards and self-critical).

As demonstrated by Table 4.1, significant positive correlations were found between S-SQRI-Parental Conflict, S-SQRI-Coach Conflict, DAS-Self-Criticism, SCL-Depression and global EDEQ score, while significant negative associations were found between S-SQRI-Parental Support, S-SQRI-Coach Support, RSES and global EDEQ score. In addition, DAS-Self-Criticism, and SCL-Depression were significantly and positively related to S-SQRI-Parental Conflict and S-SQRI-Coach Conflict, but significantly and negatively related to S-SQRI-Parental Support (not SCL-depression) and S-SQRI-Coach Support. Conversely, RSES was significantly and positively correlated to S-SQRI-Parental Support and S-SQRI-Coach Support, but significantly and negatively correlated to S-SQRI-Parental Conflict and S-SQRI-Coach Conflict. There were no significant correlations between FMPS-PS, the quality of the teammate-athlete relationship, and global EDEQ score. Thus, these variables were eliminated from all subsequent analyses.

The Mediating Effects of Self-Criticism Perfectionism, Self-Esteem, and Depression between Parent-Athlete Relationship and Eating Psychopathology

The predictor variable of S-SQRI-Parental Support, the covariate variable of gender, and the mediating variables of DAS-Self-Criticism and RSES were regressed on the dependent variable of global EDEQ score, producing a dependent model summary of $F(4,406) = 36.91, (p < .0001), R = .27, R^2 \text{ adjusted} = .26$. As shown in Figure 4.1, the negative association between S-SQRI-Parental Support and global EDEQ score was indirectly mediated by DAS-Self-Criticism and RSES. Based on 5000 bootstrapped samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2008), and controlling for the effect of gender ($b = .38, se = .10, p < .001$), the total and direct effect of S-SQRI-Parental Support on global EDEQ score were $-.26, p < .001$ and $-.07, p > .05$ respectively. The difference between the total and direct effect of S-SQRI-Parental Support and global EDEQ score was accounted for by the total indirect effect of the mediating variables, with a point estimate of $-.20$ and a bias-corrected 95% CI of $-.29$ to $-.11$ (see Table 4.2). Subsequent

examination of the specific indirect mediating effects revealed that both mediators significantly contributed to the total indirect mediating effect, with RSES accounting for -.13, and DAS-Self-Criticism accounting for -.07 of the total effect. Examination of the pair-wise contrasts of the indirect effects revealed no significant differences in the magnitude of the indirect mediating effects of RSES and DAS-Self-Criticism, suggesting that the indirect effect of RSES was not significantly larger than DAS-Self-Criticism.

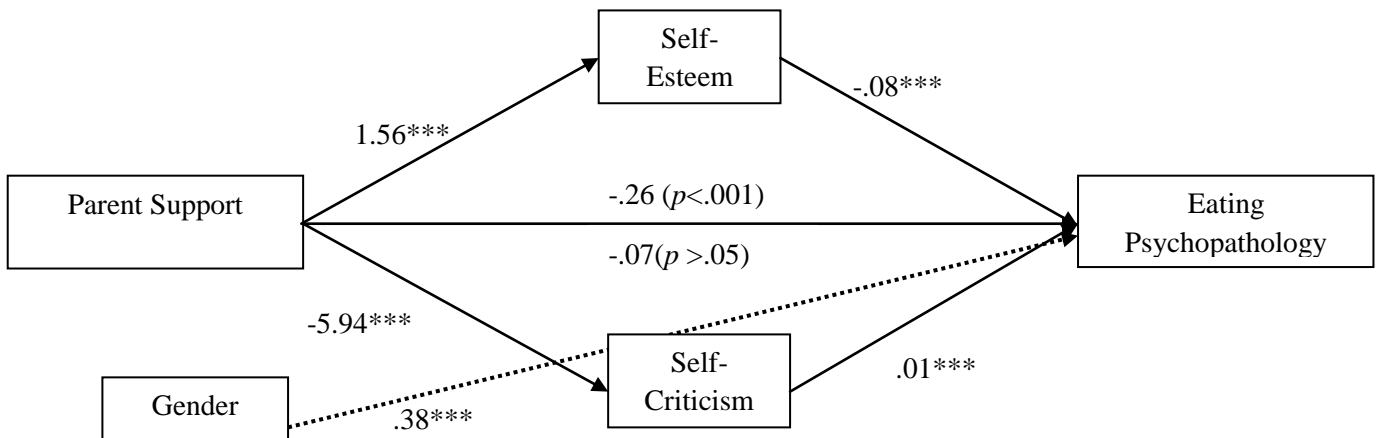


Figure 4.1. Self-critical perfectionism and self-esteem as mediators between parent-support and eating psychopathology. Unstandardised coefficients are presented, *** $p < .001$

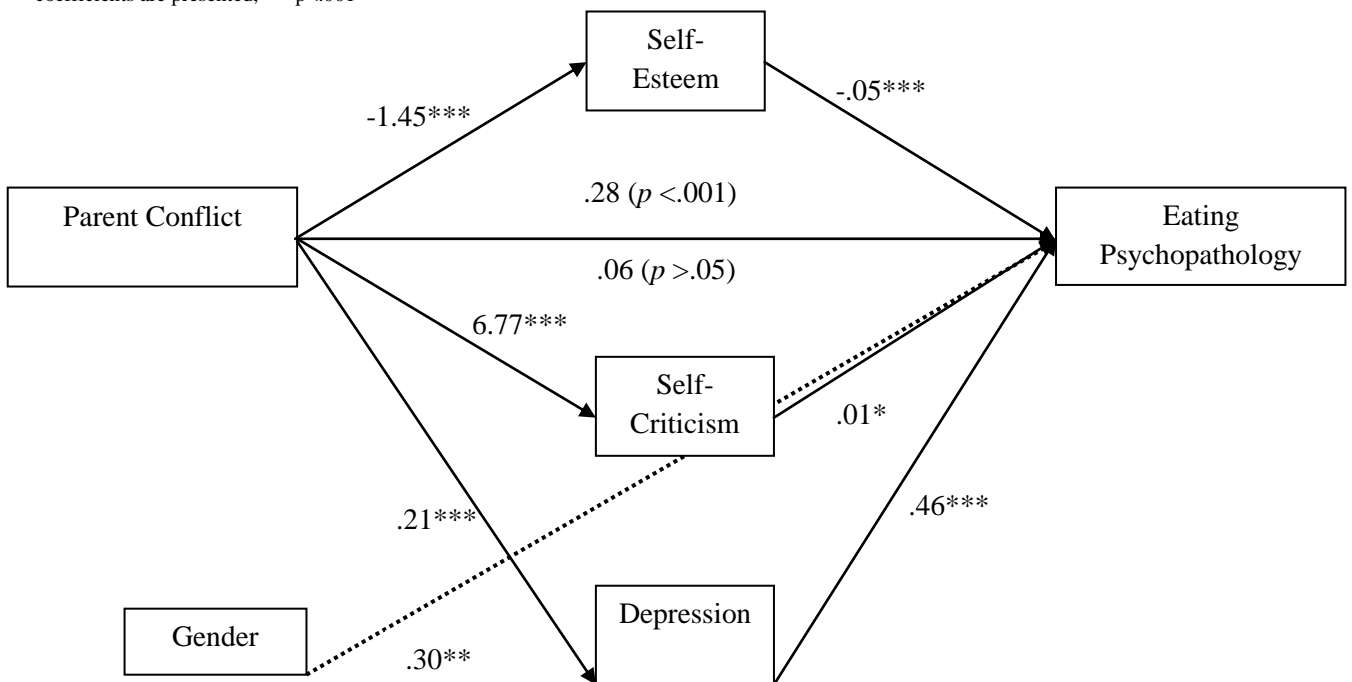


Figure 4.2. Self-critical perfectionism, self-esteem, and depression as mediators between parent-conflict and eating psychopathology. Unstandardised coefficients are presented, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.2. Mediated effects of self-critical perfectionism, self-esteem, and depression between parental S-SQRI and EDEQ.

	Parental Support				Parental Conflict			
	Bootstrapping BC 95% CI				Bootstrapping BC 95% CI			
	Point estimate	<i>SE</i>	Lower	Upper	Point estimate	<i>SE</i>	Lower	Upper
	Indirect effects							
Depression	-	-	-	-	.10	.04	.04	.18*
Self-Esteem	-.13	.04	-.21	-.07*	.08	.03	.03	.15*
Self-Criticism	-.07	.02	-.12	-.03*	.05	.02	.01	.10*
Total	-.20	.05	-.29	-.11*	.23	.06	.12	.35*
	Contrasts							
Self- Criticism v Self-Esteem	.06	.04	-.01	.16	-.03	.04	-.11	.03
Self-Criticism v Depression	-	-	-	-	-.05	.04	-.14	.02
Self-Esteem v Depression	-	-	-	-	-.02	.04	-.10	.05

Notes; BC= bias corrected CI; 5,000 bootstrap samples.

* $p < .05$ (0 does not fall between the lower and upper BC 95% CI).

Second, the predictor variable of S-SQRI-Parental Conflict, the covariate variable of gender, and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score, producing a dependent model summary of $F(5,405) = 37.81$, ($p < .0001$), $R = .32$, R^2 adjusted = .31. The positive relationship between S-SQRI-Parental Conflict and global EDEQ score was also indirectly mediated by DAS-Self-criticism, RSES, and SCL-Depression (see Figure 4.2). Controlling for the effect of gender ($b = .30$, $se = .10$, $p < .01$), the total and direct effect of S-SQRI-Parental Conflict on total EDEQ score were $.28$, $p < .001$ and $.06$, $p > .05$ respectively. The difference between the total and direct effect was again accounted for by the total indirect effect of the mediating variables, with a point estimate of $.23$ and a bias-corrected 95% CI of $.12$ to $.35$ (see Table 4.2). Further examination of the specific indirect effects indicated that all three mediators significantly contributed to the total indirect mediating effect, with SCL-Depression accounting for $.10$, RSES accounting for $.08$ and DAS-Self-Criticism accounting for $.05$ of the total effect. Examination of the pairwise contrasts revealed no significant differences in the magnitude of either of the mediating variables (see Table 4.2).

In summary, the mediational analyses revealed that the association between the quality of the parent-athlete relationship and athletes' eating psychopathology was indirectly mediated by athletes' levels of depression, self-esteem, and self-critical perfectionism.

The Mediating Effects of Self-Esteem, Self-Critical Perfectionism, and Depression between the Coach-Athlete Relationship and Eating Psychopathology

The predictor variable of S-SQRI-Coach Support, the covariate variable of gender, and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score, producing a dependent model summary of $F(5,405) = 37.83$, ($p < .0001$), $R = .32$, R^2 adjusted = .31. Mirroring the pathways between S-SQRI-Parental Support and global EDEQ score, the negative association between S-SQRI-Coach Support and global EDEQ was indirect (see Figure 4.3). Controlling for the effect of gender ($b = .31$, $se = .10$, $p < .01$), the total and direct effect of S-SQRI-Coach Support on global EDEQ score were $-.18$, $p < .05$ and $-.05$, $p > .05$ respectively. The difference between the total and direct effect of S-SQRI-Coach Support and global EDEQ score was accounted for by the total indirect effect of the mediating variables, with a point estimate of $-.13$ and a bias-corrected 95% CI of $-.22$ to $-.04$ (see Table 4.3). Examination of

the specific indirect mediating effects revealed that all three mediators significantly contributed to the total indirect mediating effect with SCL-Depression accounting for -.06, RSES accounting for -.05, and DAS-Self-Criticism accounting for -.02 of the total effect. Subsequent examination of the pair-wise contrasts of the indirect effect showed no significant differences in the magnitude of the specific indirect effects of RSES, DAS-Self-Criticism, and SCL-Depression.

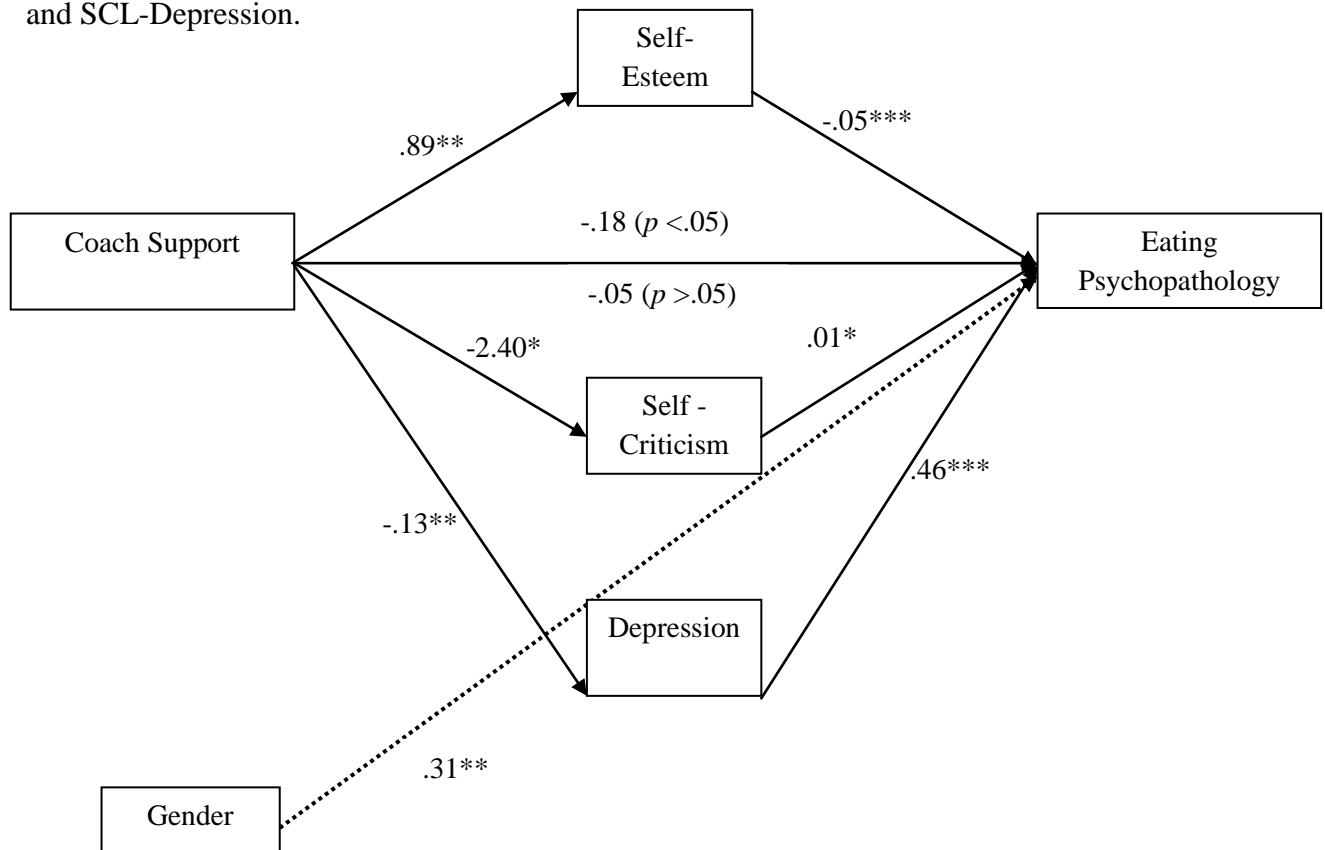


Figure 4.3. Self-critical perfectionism, self-esteem, and depression as mediators between coach-support and eating psychopathology. Unstandardised coefficients are presented, * $p < .05$, ** $p < .01$, *** $p < .001$

Finally, controlling for the effect of gender ($b = .30$, $se = .10$, $p < .01$), the predictor variable of S-SQRI-Coach Conflict, the covariate variable of gender and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score, producing a dependent model summary of $F(5,405) = 37.70$, ($p < .0001$), $R = .32$, R^2 adjusted = .31. Like the relationship between S-SQRI-Parental Conflict and global EDEQ score, the positive relationship between S-SQRI-Coach Conflict and global EDEQ score was indirect (see Figure 4.4). The total and direct effect of S-SQRI-Coach Conflict on global EDEQ score were $.17$, $p > .05$ and $-.03$, $p > .05$ respectively. The difference between the total and direct effect was again accounted for by

the total indirect effect of the mediating variables, with a point estimate of .20 and a bias-corrected 95% CI of .12 to .30 (see Table 4.3). Further examination of the specific indirect effects indicated that all three mediators contributed to the total indirect mediating effect, with SCL-Depression accounting for .09, RSES accounting for .07, and DAS-Self-Criticism accounting for .04 of the total effect. Subsequent examination of the pairwise contrasts revealed no significant differences in the magnitude of all three mediating variables.

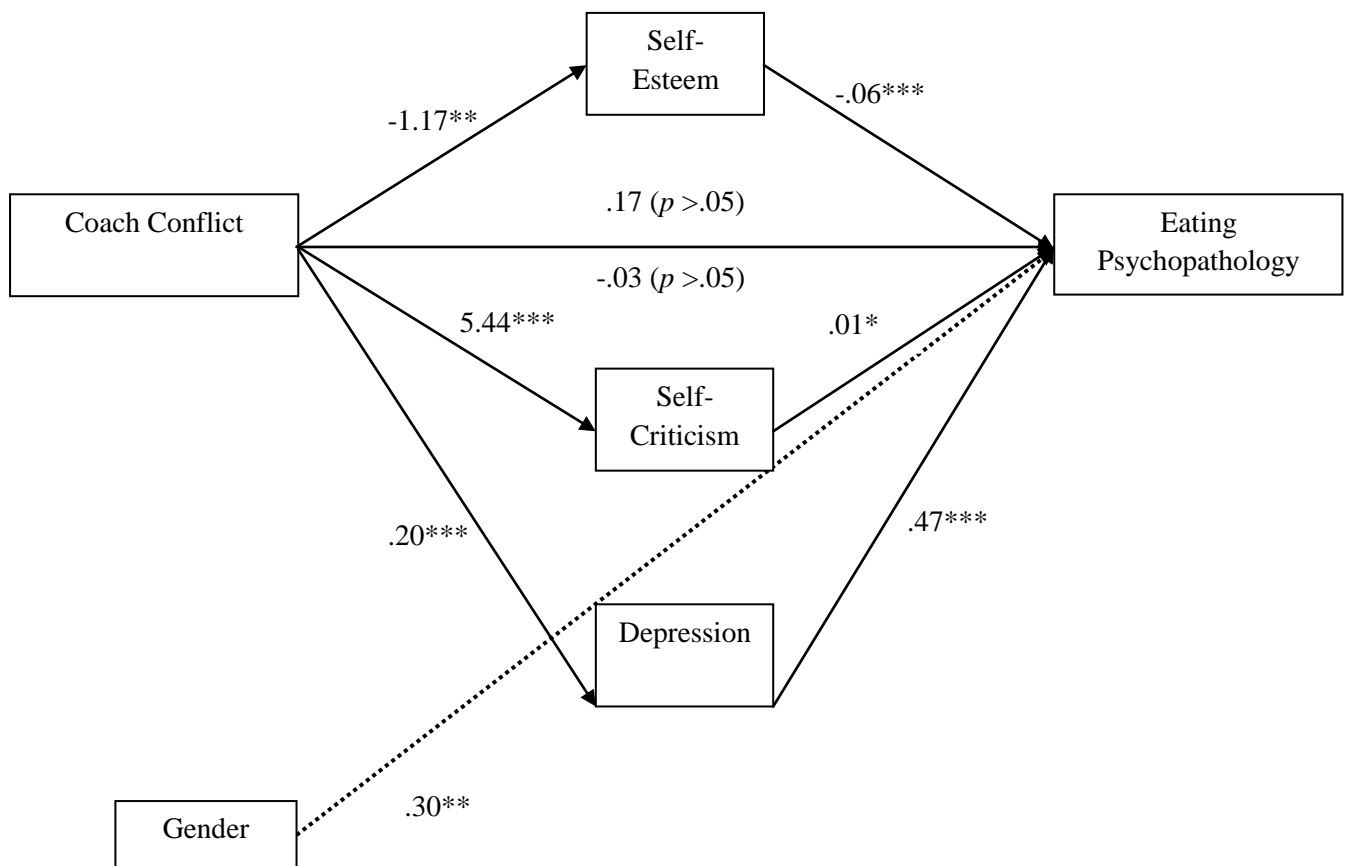


Figure 4.4. Self-critical perfectionism, self-esteem, and depression as mediators between coach-conflict and eating psychopathology.

Unstandardised coefficients are presented, * $p < .05$, ** $p < .01$, *** $p < .001$

In summary, the bootstrapping mediation analyses revealed that the association between the quality of the coach-athlete relationship and athletes' eating psychopathology was indirect and mediated by self-critical perfectionism, self-esteem, and depression.

Table 4.3. Mediated effects of self-critical perfectionism, self-esteem, and depression between coach S-SQRI and EDEQ.

	Coach Support				Coach Conflict			
	Bootstrapping BC 95% CI							
	Point estimate	<i>SE</i>	Lower	Upper	Point estimate	<i>SE</i>	Lower	Upper
	Indirect effects							
Depression	-.06	.03	-.12	-.01*	.09	.03	.05	.16*
Self-Esteem	-.05	.02	-.10	-.01*	.07	.03	.02	.13*
Self-Criticism	-.02	.01	-.05	-.00*	.04	.02	.01	.10*
Total	-.13	.04	-.22	-.04*	.20	.04	.12	.30*
	Contrasts							
Self-Criticism v Self-Esteem	.03	.02	-.01	.09	-.02	.04	-.10	.05
Self-Criticism v Depression	.04	.03	-.01	.10	-.05	.04	-.13	.02
Self-Esteem v Depression	.01	.03	-.04	.06	-.03	.03	-.10	.04

Notes; BC= bias corrected CI; 5,000 bootstrap samples;

* $p < .05$ (0 does not fall between the lower and upper BC 95% CI).

4.4. Discussion

In an attempt to bridge the observable gap between the scientific understanding of interpersonal processes and its relation to eating psychopathology amongst athletes, the current study first examined the link between situational interpersonal difficulties as reflected in the quality of multiple dyadic relationships (i.e., parent-athlete, coach-athlete, and teammate-athlete relationships) and eating psychopathology. Second, it examined the contribution of the intervening processes of self-esteem, clinical perfectionism, and depression in such association. In accordance with the first prediction, as well as previous findings within both the general population (e.g., Jacobi, Hayward et al., 2004; McIntosh et al., 2000) and the athletic population (e.g., Jones et al., 2005; Scoffier et al., 2010), relationship quality was associated to eating psychopathology. In particular, the results suggest that good quality relationships characterised by high levels of perceived support and low levels of interpersonal conflict, with parents and coaches, is related to healthy eating psychopathology, while poor quality parental and coach relationships characterised by lack of perceived support and high conflict is related to elevated eating psychopathology.

The current results further extend previous findings within the general population by demonstrating a multiple pathway between relationship quality and eating psychopathology (e.g., Jones et al., 2006; O’Kearney, 1996). Consistent with the study hypothesis, self-esteem, depressive symptoms, and self-critical perfectionism were found to mediate the link between the quality of the parental and coach-athlete relationships, and eating psychopathology. These findings suggest that the influence of relationship quality on athletes’ eating psychopathology is indirect, and that elevated eating psychopathology is only likely to manifest in athletes who maintain poor functioning relationships, if they have low self-esteem, are highly self-critical, and exhibit depressive symptoms (depressive symptoms not necessary for parent-support). The findings further revealed that each mediating process specifically contributed to the association between relationship quality and athletes’ eating psychopathology; one mediating process did not perform better than another, suggesting that all three processes are vital in transferring the effect of relationship quality to eating psychopathology. It is also certainly important to note that out of the two types of perfectionism measured, only self-critical perfectionism was found to mediate the relationship between relationship quality and eating psychopathology. Personal standards perfectionism, on the other hand, was not related to eating psychopathology in the current

study. These findings are in line with previous findings that have found maladaptive self-evaluative perfectionism to be related to elevated eating psychopathology (e.g., Dunkley, Blankstein et al., 2006; Dunkley & Grilo, 2007; Fenning et al., 2008). Moreover, in line with the transdiagnostic theory of eating disorders (Fairburn et al., 2003), it could be postulated that the possession of high standards does not affect athletes' eating psychopathology, but rather it is how these standards are evaluated when they are not met that is maladaptive, and likely to enhance one's vulnerability to the development of unhealthy eating psychopathology.

Collectively, the current findings suggest that a poor quality parental and coach-athlete relationship indirectly influences elevated eating psychopathology via low levels of self-esteem and high levels of self-critical perfectionism, and depression. In the existing sport psychology literature, the coach and their coaching behaviours have been frequently associated with disordered eating amongst athletes (e.g., Biesecker & Martz, 1999; Jones et al., 2005; Muscat & Long, 2008). However, the current findings demonstrate that *both* parent-athlete relationship and the coach-athlete relationship influence athletes' eating psychopathology, with the strength of the association between the quality of the parent-athlete relationship and athletes' eating psychopathology marginally larger than the coach-athlete relationship and athletes' eating psychopathology. These findings suggest that although the parent-athlete and coach-athlete relationships are considered to represent two different relational contexts, each serving different purposes and function within an athletes' life, they may in fact be complementary (Jowett & Cramer, 2010), as both types of relationships appear to be capable of influencing athletes' eating psychopathology.

Interestingly, the quality of the teammate-athlete relationship was not found to be associated with athletes' eating psychopathology. This is inconsistent with previous findings that have demonstrated an indirect relationship between the quality of teammate-athlete relationships and disturbed eating attitudes (e.g., Scoffier et al., 2010), those that have found teammates to negatively influence athletes' eating attitudes and behaviours (e.g., Rosen et al., 1986; Thompson & Sherman, 1999b; Williamson et al., 1995), as well as previous findings that have found teammates to positively influence athletes' eating habits (e.g., Hausenblas & Carron, 2000). The discrepancy between the current finding and say the previous findings of Scoffier et al. (2010) could be related to variation in the manner in which the study variables were assessed. Specifically, the current study used measures that were not as contextualised

and solely reflective of sporting experiences (i.e., measured global self-esteem, general relationship quality, general perfectionism, and depression), while Scoffier et al. used measures related to sport participation (i.e., physical ability attributes, adapted sport-specific relationship quality measure for use with coach and peers). Therefore it is possible that the quality of the teammate-athlete relationship was found to be related to disturbed eating attitudes in Scoffier et al.'s study as a result of focusing on contextualised sport specific variables. However, this is speculation, and further research is warranted examining such links.

Despite the study's effort to build upon previous limitations (e.g., a large representative sample of male and female athletes to make the results more generalisable, investigating the effect of multiple mediators, and multiple dyadic relationships), a few limitations should be taken into account when interpreting the current findings. First, the study was exploratory and cross-sectional in nature; therefore conclusions about causality cannot be inferred. Although the current study was guided by theory and relevant research which highlights situational interpersonal difficulties as a possible precursor to the development of eating disorders (e.g., Fairburn et al., 2003; Johnson, Cohen, Kasen et al., 2002), conversely it is also possible that difficulties in relationships surface as a result of elevated eating psychopathology (e.g., Jacobi, Hayward et al., 2004; Jones et al., 2006). Thus, there may be bi-directional relations between the two; however, without employing a prospective approach, it is difficult to determine the directionality of the relations observed in the current study. Therefore, future studies should seek to employ a prospective approach to determine the directionality of relationship quality with multiple dyads, self-esteem, depression, and clinical perfectionism and eating psychopathology. Second, the present study employed self-report measures to measure all study variables, therefore results are subject to social desirability and acquiescence response bias. Third, the study only examined the association between relationship quality and eating psychopathology from the perspective of the athlete. Therefore, future studies should seek to employ a dyadic approach to investigating such association, as studies have shown that there are often discrepancies in the parent-child perceptions of parental rearing styles in eating disordered individuals (e.g., Bonne et al., 2003). Finally, the athletes' scores on the eating psychopathology measure was relatively healthy, therefore it is unclear whether the relationships observed in this study would extend to athletes with eating disorders. Moreover, as a control group of non-athletes

was not included, it is also unclear whether these relations would extend to the general population. Thus, future studies should seek to replicate the present study with a sample of non-athletic controls, as well as with a clinical sample, in an attempt to understand whether the current observed mechanisms involved in the eating psychopathology of athletes would extend to the general population, and patients with eating disorders.

The present findings contain both theoretical and clinical significance. First, the present study employed male and female athletes competing at different competition levels (e.g., elite to university level) and a wide range of sports (e.g., team and individual) and as such is generalisable to- and representative of the athletic environment. Although the present study requires replication with a sample of non-athletes and clinical sample, on the basis of the current findings it can be speculated that eating disorders in athletes may arise in a similar manner to that of the general population (e.g., poor quality relationships, low self-esteem, self-critical perfectionism, and depressive symptoms). Thus, NGBs, sport organisations, coaches, parents, and those working with athletes need to recognise, and be made aware of the potential risk that poor quality relationships have on athletes' eating psychopathology, with the emphasis on helping coaches, parents, and athletes maintaining positive and supportive relationships. Due to the mediating effect of self-esteem, depression, and self-critical perfectionism, it may also be beneficial to develop workshops and prevention programmes for athletes themselves, aimed at enhancing their self-esteem, teaching them to evaluate their goals and performances appropriately (especially when they are not met), and decreasing depressive symptoms.

The findings also have implications for the identification and treatment of eating disordered athletes. Identification of athletes with eating disorders is considered a complicated and difficult problem (Currie & Crosland, 2009; Petrie & Greenleaf, 2007). Often the traits present in eating disordered individuals are the same traits required to be a top level athlete, thus preventing the ability to spot an eating disordered athlete from a committed and hard working athlete or a 'good athlete' (Thompson & Sherman, 1999a). Therefore, it is possible that by measuring the type of perfectionism that an athlete holds, it would enable us to differentiate the 'good athletes' striving to make improvements, from the athletes who are at risk of developing problematic eating. Finally, clinicians working with both athletes and non-athletes should be aware that poor quality relationships are likely to lower self-esteem, increase self-critical perfectionism, and depressive symptoms, which further exacerbate

disordered eating. Thus, treatment interventions that focus on decreasing depressive symptoms and self-critical perfectionism, and enhancing self-esteem may lead to improvements in eating disordered symptoms.

4.5. Conclusion

The present study has substantially extended the limited understanding of how situational interpersonal difficulties reflected in athletes' current relationships with parents, coaches, and teammates affect athletes' eating psychopathology, as well as extending our understanding of the role of self-esteem, self-critical perfectionism, and depression in athletes' eating psychopathology. In particular, current findings suggest that athletes' who perceive their relationships with their coaches and parents as lacking in support and high in interpersonal conflict, have low self-esteem, are highly self-critical when they do not achieve their goals, and display high levels of depressive symptoms are at increased risk of developing disordered eating. Thus parents and coaches need to endeavour to facilitate the development of healthy relationships with athletes, so that athletes can perform to their optimum both physically and mentally.

5

Eating Psychopathology amongst Athletes: Links to Attachment Styles

Abstract

Objective: The aims of the study were two-fold; first it aimed to determine the association between dispositional interpersonal difficulties as reflected in athletes' attachment styles, and eating psychopathology. Second, it aimed to simultaneously assess the mediating effects of self-esteem, clinical perfectionism, and depression in such association. **Method:** Four hundred and eleven British athletes completed self-report instruments pertaining to eating psychopathology, attachment styles, self-esteem, depression, and perfectionism. **Results:** Both avoidant and anxious attachment styles were related to athletes' eating psychopathology. However, such associations were found to be indirect and mediated via athletes' levels of self-esteem, self-critical perfectionism, and depression, with self-esteem and depression identified as more salient mediators than self-critical perfectionism. **Conclusion:** The current findings provide evidence to suggest that insecure attachment styles influence athletes' eating psychopathology via their impact on self-esteem, depression, and self-critical perfectionism. Moreover, self-esteem and depression may play a more significant role in transferring the impact of insecure attachment styles to elevated eating psychopathology.

5.1. Eating Psychopathology among Athletes: Links to Attachment Styles

Dispositional interpersonal difficulties have been linked to both the development and maintenance of eating disorders (Fairburn et al., 2003). Attachment theory (Bowlby, 1969, 1973, 1988) highlights the importance of understanding the self through one's interactions and relationships with significant others (see Friedberg & Lyddon, 1996; Tasca et al., 2004, 2007). Rooted in early life experiences with a primary caregiver, attachment styles underline the emotional connection between these two people based on the caregiver's ability to respond and supply a secure base of protection, comfort, and support, especially during periods of distress and threats (Bowlby, 1969). These experiences subsequently lead to the

development of attachment security or attachment insecurity which is further categorised as anxious-ambivalent and avoidant (Ainsworth et al., 1978). Bowlby (1969) also proposed that attachment styles can affect a person throughout life and are considered to remain relatively stable from childhood to adulthood, although not in a fixed, deterministic manner (Bowlby, 1973). These dispositional attachment styles are reported to govern patterns of cognitions, affect, and behaviour, as well as determining an individual's degree of vulnerability to the development of psychopathology (Bowlby, 1973, 1988).

There are recognised links between eating disorders and disruptive early childhood attachment experiences (e.g., Chassler, 1997; Kenny & Hart, 1992; Latzer et al., 2002; Lehoux & Howe, 2007), as well as negative attachment experiences with romantic partners, and close friends (Broberg et al., 2001; Evans & Wertheim, 1998, 2005; Ward, Ramsay, Turnbull et al., 2000). In particular, eating disordered individuals report their early attachment figures as significantly less responsive, available, trustworthy, more rejecting and abandoning than healthy controls (see Chassler, 1997). Moreover, relationships with current attachment figures are reported to be marred by fears of rejection, uncertainty and abandonment, discomfort with relationship closeness, experiences of frustration and jealousy, and overall less relationship satisfaction (see Evans & Wertheim, 1998, 2005).

While there appears to be consensus that insecure attachment styles are more synonymous with eating disordered symptomatology (e.g., O'Kearney, 1996; Ward, Ramsay, & Treasure, 2000; Zachrisson & Skårderud, 2010), it remains unclear whether a *specific* insecure attachment style (e.g., avoidant or anxious) is related to problematic eating, as findings have often been conflicting. For example, a number of studies have highlighted that anxious attachment style is more strongly associated to poor body image (e.g., Cash et al., 2004), higher body dissatisfaction (e.g., Evans & Wertheim, 1998; McKinley & Randa, 2005), increased disordered eating attitudes and behaviours (e.g., Eggert et al., 2007), as well as clinical eating disorders (e.g., Armstrong & Roth, 1989; Kenny & Hart, 1992), than avoidant attachment styles. Conversely, others have reported that an avoidant attachment style is more strongly related to disordered eating (e.g., Elgin & Pritchard, 2006; Ramacciotti et al., 2001), especially in the absence of depression (Cole-Detke & Kobak, 1996). Alternatively, a number of studies have highlighted both anxious and avoidant attachment to be comparably related to eating disordered symptomatology (e.g., Broberg et al., 2001; Evans & Wertheim, 2005; Wade, Ramsay, Turnbull et al., 2000).

Further to studies not discriminating between anxious versus avoidant attachment styles, studies are yet to examine those variables that might mediate the relationship between insecure attachment styles and eating attitudes and behaviours; rather, studies have tended to assume a single pathway between eating disorders and attachment styles (O’Kearney, 1996). In their transdiagnostic theory of eating disorders, Fairburn et al. (2003) highlighted three potentially important mediating variables; self-esteem, clinical perfectionism, and depression in the link between interpersonal difficulties and eating psychopathology. Correspondingly, there are established empirical links between self-esteem, perfectionism, depression, and eating disorders (e.g., Bardone-Cone et al., 2007; Button et al., 1997; O’Brien & Vincent, 2003), as well as between self-esteem, perfectionism, depression, and attachment styles (see Mikulincer & Shaver, 2007). However, studies to date have explored the effect of self-esteem, perfectionism, and depression on eating disorders individually; rarely have all three factors been investigated simultaneously in order to elucidate the most parsimonious psychosocial model. Thus, the examination of these three processes collectively could not only be key to understanding how eating attitudes and behaviours are associated with attachment styles, but the comparison of the relative strengths of self-esteem, depression, and clinical perfectionism against each other will also help identify the most significant catalyst(s) upon which attachment styles and eating psychopathology converge.

In contrast, while findings have demonstrated an association between insecure attachment styles and eating disorders within the general population, such associations have yet to be explored within the context of sport. To date, research conducted on athletes has primarily focused on the associations between disordered eating and sport-specific factors such as injury (Sundgot-Borgen, 1994), critical comments from coaches (Muscat & Long, 2008) and the sporting environment (Hulley et al., 2007), leaving a very limited and narrow understanding of how eating disorders may arise amongst athletes. Thus, the need to move beyond the current limited knowledge-base, and examine more generic, and context free psychosocial factors is paramount, as athletes with eating disorders not only risk compromising their performance, but also their health, and general wellbeing (Currie & Morse, 2005; Petrie & Greenleaf, 2007). Therefore, the first aim of the current study was to determine the relationship between attachment styles and eating psychopathology amongst a representative sample of athletes. It was predicted that athletes with an insecure attachment style would report increased eating psychopathology. Second, the study examined whether a

specific attachment style would be synonymous with elevated eating psychopathology. Due to conflicting previous research, it was hypothesised that both variants of insecure attachment styles would be related to elevated eating psychopathology. Finally, the study examined the mediating effects of self-esteem, clinical perfectionism, and depression in the association between attachment styles and eating psychopathology. Owing to the lack of research examining such processes concomitantly, no priori hypotheses were postulated as to which of these mediators would perform as a better mediator. Rather, it was hypothesised that self-esteem, depression, and clinical perfectionism would all contribute to the relationship between insecure attachment and eating psychopathology.

5.2. Method

Participants

The current sample was composed of 411 (159 males and 252 females) British athletes with a mean age of 20.95 years ($SD=3.67$, range 16-36) and a BMI of 22.72 ($SD=3.16$). The current participant sample is the same as the sample presented in Chapter 4, thus readers are referred to Chapter 4 for further details.

Measures

The following section provides a brief overview of the measures used in this study; for a more detailed outline of these measures, the reader is referred to Chapter 2 of this thesis.

Demographic questionnaire. This questionnaire assessed the athletes' age, gender, ethnicity, as well as the nature and extent of their athletic involvement.

Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 2008). For the purpose of the current study, only the global EDEQ score was used, which is the composite mean of the four subscales (eating concern, shape concern, weight concern and restraint), with higher scores indicating greater levels of eating psychopathology. The EDEQ exhibited excellent internal consistency, recording 0.94 with the current sample.

Experiences in Close Relationships (ECR; Brennan et al., 1998). The ECR was employed to measure the athletes' attachment styles. Specifically, three attachment styles are yielded, with high scores on the anxious subscale reflecting an anxious attachment style (ECR-ANX), while high scores on the avoidant subscale reflects an avoidant attachment style

(ECR-AV). In contrast, low scores on both the anxious and avoidant scale reflect a secure attachment style. For the purpose of this study, the athletes were asked to consider how they generally feel in relation to their relationship with coaches, parents, and teammates. Cronbach's alpha scores of 0.91 were recorded for both subscales in the current sample.

Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990).

Complying with the assertion of Shafran et al. (2002), only the personal standards subscale (FMPS-PS) was used for the purpose of this study. A Cronbach's alpha score of 0.83 was recorded for the current sample.

Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978). For the purpose of the present study, the 15 item self-criticism perfectionism subscale (DAS-SC) was used. Athletes' levels of self-criticism recorded a Cronbach's alpha score of 0.92.

Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965). The RSES was used to measure athletes' general self-esteem. A Cronbach's alpha of 0.87 was recorded for this sample.

Symptom Checklist 90R (SCL-90; Derogatis, 1983). For the purpose of this study only the depression subscale³ was used (SCL-Depression). A Cronbach's alpha of 0.88 was recorded with this sample.

Procedure

Following ethical clearance by the Institutional Ethical Advisory Committee, data were collected via contacts made with NGBs and sport organisations (e.g., sport clubs). Specifically, the questionnaires were administered either electronically (via email or a secure webpage); or physically prior to a specific training session (and returned in a sealed envelope the following week) or during University lectures.

Data Analysis

The data were not normally distributed. Therefore, non-parametric tests were employed wherever possible. Preliminary analyses revealed significant gender differences in athletes' EDEQ scores ($U=14029.500$, $Z= 5.12$, $p <.001$), with female athletes ($M=1.30$,

³ The depression subscale is composed of 13 items, but one item related to sexual pleasure was removed from the present study as it was deemed inappropriate for the purpose of this study.

SD=1.22) reporting a higher global EDEQ score than male athletes ($M=0.70$, $SD=0.76$), thus gender was used as a covariate for all mediation analyses. The data were subsequently analysed in the following ways. To test the study's hypothesis that ECR, FMPS-PS, DAS-SC, RSES, and SCL-Depression would be associated to global EDEQ, one tailed Spearman Rho correlations were employed. Finally, to test the mediating effect of athletes' levels of FMPS-PS, DAS-SC, RSES, and SCL-Depression, between ECR and global EDEQ, and to assess the specific indirect effect of each mediating variable in such relationship, two sets of the bootstrapping mediation analyses involving simultaneous entry regression analyses were used (see Chapter 2 for more details). All meditational analyses were conducted using a macro for SPSS designed to assess indirect effects of multiple mediators on SPSS 17 (Preacher & Hayes, 2008).

5.3. Results

Descriptive Statistics

Table 5.1 presents the means (Ms), standard deviations (SDs), and results from the Spearman Rho used to assess the associations between athletes' attachment styles, personal standard perfectionism, self-critical perfectionism, self-esteem, depression, and eating psychopathology. The current sample of athletes' scores on the ECR were comparable with the previous study of Davis and Jowett (2010), although the current sample of athletes scored higher on ECR-ANX, thus suggesting that the current sample of athletes were more anxiously attached. However, it should be noted that all athletes scored relatively low on both subscales, indicating that as a whole the current sample of athletes were securely attached (see Chapter 4 for further details on the other measures). As shown in Table 5.1, the global EDEQ score was found to be significantly and positively associated with ECR-Avoidant Attachment, ECR-Anxious Attachment, DAS-Self-Criticism, and SCL-Depression, but significantly and negatively related with RSES. In addition, ECR-Avoidant Attachment, and ECR-Anxious Attachment were significantly and positively correlated to DAS-Self-Criticism and SCL-Depression, but negatively correlated to RSES. There was no significant association however, between FMPS-PS and EDEQ, nor between FMPS-PS and ECR-Avoidant Attachment and ECR-Anxious Attachment, thus FMPS-PS was eliminated from subsequent analyses.

Table 5.1. Ms, SDS, and Spearman Rho correlations between EDEQ, ECR, FMPS-PS, DAS-Self-Criticism, RSES, and SCL-Depression scores

Variables	Ms	SDs	ECR-AV	ECR-ANX	FMPS-PS	DAS-SC	RSES	SCL-DEP	EDEQ
1. ECR-AV	3.29	0.96	1.0	.38**	.08	.26**	-.36**	.23**	.18**
2. ECR-ANX	3.51	1.00	-	1.0	.04	.43**	-.58**	.58**	.38**
3. FMPS-PS	26.87	4.54	-	-	1.0	.28**	.04	.08	.06
4. DAS-SC	44.39	15.96	-	-	-	1.0	-.40**	.37**	.35**
5. RSES	20.56	4.64	-	-	-	-	1.0	-.52**	-.41**
6. SCL-Depression	0.93	0.68	-	-	-	-	-	1.0	.47**
7. EDEQ	1.07	1.11	-	-	-	-	-	-	1.0

Notes: ECR-AV=avoidant attachment; ECR-ANX= anxious attachment; FMPS-PS= personal standards perfectionism; DAS-SC= self-criticism perfectionism; RSES= self-esteem;

SCL-DEP= depression; EDEQ= Global EDEQ score.

** $p < .01$, one tailed.

The Mediating Effect of Self-Criticism Perfectionism, Self-Esteem, and Depression between Attachment Styles and Eating Psychopathology

Controlling for gender, the predictor variable of ECR-Avoidant Attachment and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score, producing a dependent model summary of $F(5,405) = 37.93$, ($p < .0001$), $R = .32$, R^2 adjusted = .31. As shown in Figure 5.1, the positive association between ECR-Avoidant Attachment and global EDEQ score was indirect and mediated by DAS-Self-Criticism, SCL-Depression, and RSES.

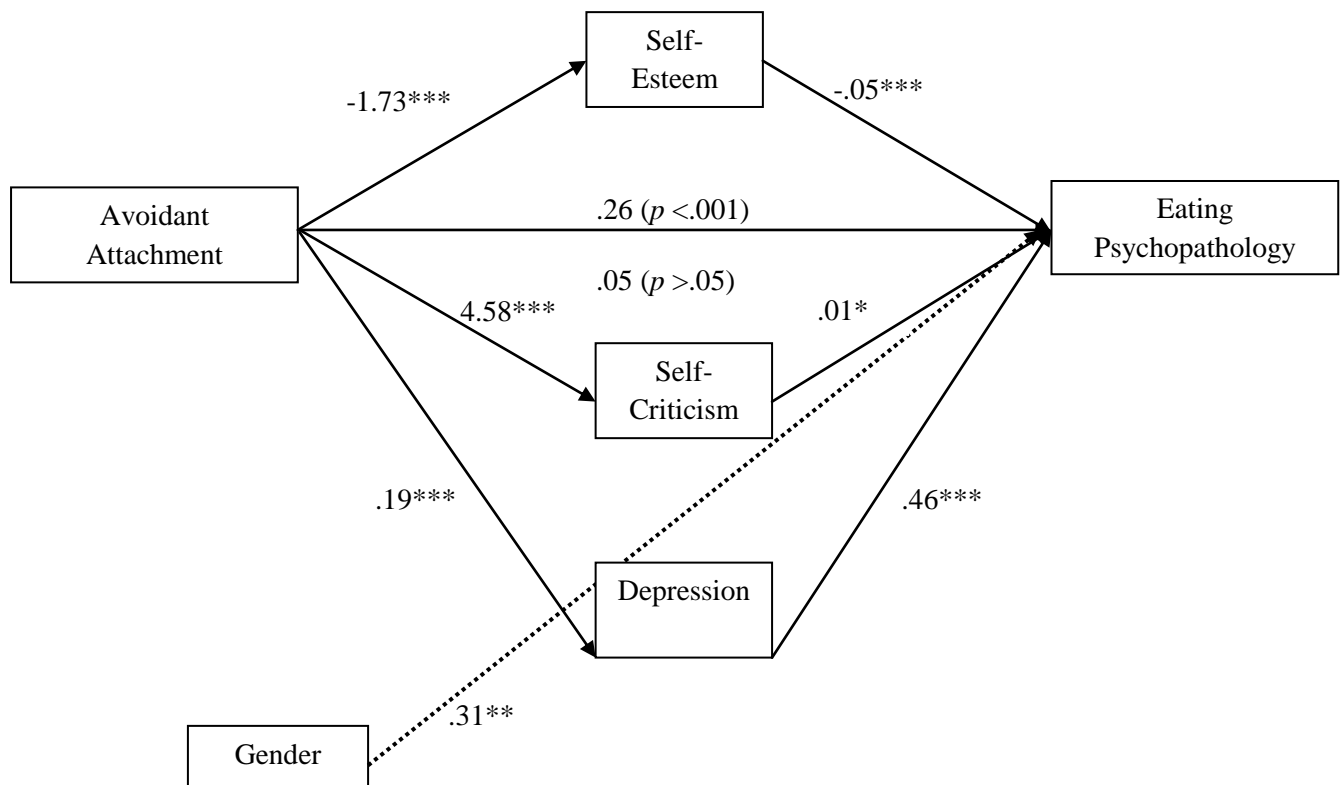


Figure 5.1. Self-critical perfectionism, self-esteem, and depression as mediators between athletes' avoidant attachment style and eating psychopathology. Unstandardised coefficients are presented. * $p < .05$, ** $p < .01$, *** $p < .001$

Based on 5000 bootstrapped samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2008) and controlling for the effect of gender ($b = .31$, $se = .10$, $p < .01$), the total and direct effect of ECR-Avoidant Attachment on global EDEQ score were $.26$, $p < .001$ and $.05$, $p > .05$ respectively. The difference between the total and direct effect of ECR-Avoidant Attachment and global EDEQ score was accounted for by the total indirect effect of the mediating variables; DAS-Self-Criticism, RSES, and SCL-Depression, with a point estimate of $.21$ and a bias-corrected 95% CI of $.15$ to $.29$ (see Table 5.2).

Table 5.2. Mediated effects of self-critical perfectionism, self-esteem, and depression between ECR and EDEQ.

	Avoidant Attachment (ECR-AV)				Anxious Attachment (ECR-ANX)			
	Bootstrapping BC 95% CI							
	Point estimate	SE	Lower	Upper	Point estimate	SE	Lower	Upper
Indirect effects								
Depression	.09	.02	.05	.14*	.18	.04	.11	.25*
Self-Esteem	.09	.02	.05	.14*	.14	.03	.08	.21*
Self-Criticism	.03	.02	.00	.07*	.05	.02	.01	.10*
Total	.21	.04	.15	.29*	.37	.05	.28	.48*
Contrasts								
Self-Criticism v Self-Esteem	-.06	.03	-.12	-.01*	-.09	.04	-.17	-.01*
Self-Criticism v Depression	-.05	.03	-.11	-.00*	-.12	.04	-.21	-.04*
Depression v Self-Esteem	.00	.03	-.06	.06	-.03	.05	-.13	.07

Notes; BC= bias corrected CI; 5,000 bootstrap samples

* p <.05 (0 does not fall between the lower and upper BC 95% CI)

Examination of the specific indirect mediating effects revealed that all three mediators significantly contributed to the total indirect mediating effect, with RSES accounting for .09, SCL-Depression accounting for .09, and DAS-Self-Criticism accounting for .03 of the total effect. Further examination of the pair-wise contrasts of the indirect effect showed that the specific indirect effect of ECR-Avoidant Attachment on global EDEQ score through RSES and SCL-Depression was significantly larger than the indirect effect through DAS-Self-Criticism; however, there was no significant difference between the indirect mediating effect of RSES and SCL-Depression.

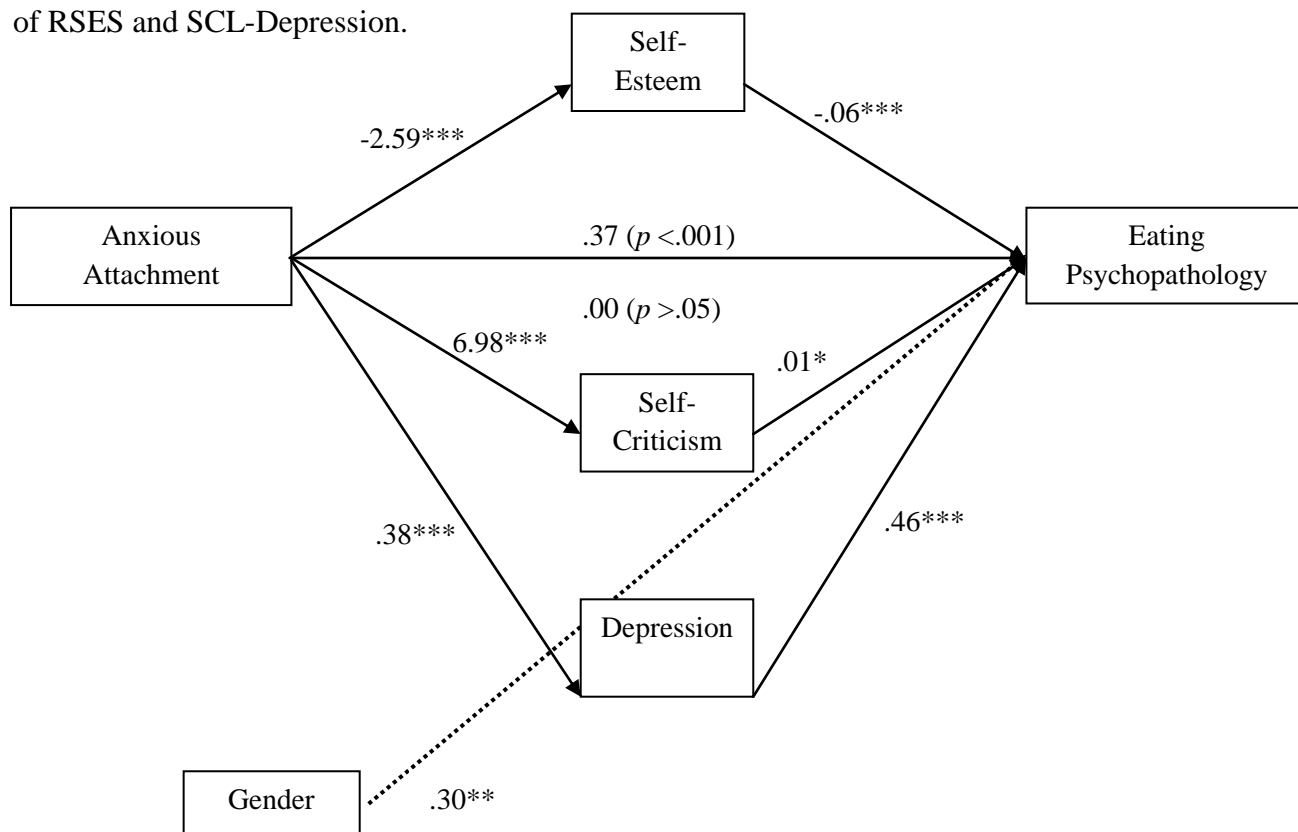


Figure 5.2. Self-critical perfectionism, self-esteem, and depression as mediators of the link between athletes' anxious attachment style and eating psychopathology. Unstandardised coefficients are presented. * $p < .05$, ** $p < .01$, *** $p < .001$

Controlling for gender ($b = .30$, $se = .10$, $p < .01$), the predictor variable of ECR-Anxious Attachment and the mediating variables of DAS- Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score, producing a model summary of $F(5, 405) = 37.65$, ($p < .0001$), $R = .32$, R^2 adjusted = .31. As shown in Figure 5.2, the positive association between ECR-Anxious Attachment and global EDEQ score was indirect and mediated by DAS- Self-Criticism, RSES, and SCL-Depression. The total and direct effect of ECR-anxious attachment on total EDEQ score were .37, $p < .001$ and .00, $p > .05$ respectively. The difference between the total and direct effect was again

accounted for by the total indirect effect of the mediating variables, with a point estimate of .37 and a bias-corrected 95% CI of .28 to .48 (see Table 5.2). Further examination of the specific indirect effects indicated that all three mediators significantly contributed to the total indirect mediating effect, with SCL-Depression accounting for .18, RSES accounting for .14, and DAS- Self-Criticism accounting for .05 of the total effect. Finally, examination of the pair-wise contrasts of the indirect effect showed that the specific indirect effect of ECR-Anxious Attachment on global EDEQ score through RSES and SCL-Depression was significantly larger than the indirect effect through DAS-Self-Criticism. However, there was no significant difference between the indirect mediating effect of RSES and SCL-Depression (see Table 5.2).

In summary, the bootstrapping mediation analyses revealed that the association between avoidant attachment, anxious attachment, and eating psychopathology amongst athletes was indirect, and fully accounted for by the mediating variables of self-esteem, self-critical perfectionism, and depression. Moreover, the mediation analyses showed that self-esteem and depression contributed significantly more to the association than self-critical perfectionism. This suggests that self-esteem and depression may play a more critical role in the link between attachment styles and eating psychopathology amongst athletes.

5.4. Discussion

Guided by the psychosocial processes proposed to be of relevance both to the development and maintenance of eating disorders (Fairburn et al., 2003), the current study is the first study to examine the link between dispositional interpersonal difficulties as reflected in attachment styles and eating psychopathology amongst athletes. In addition, the study further explored the effects of multiple mediators; self-esteem, clinical perfectionism, and depression in such association. In keeping with the first study hypothesis, and previous findings within the non-athletic population (e.g., Chassler, 1997; O’Kearney, 1996; Ward, Ramsay, & Treasure, 2000), elevated levels of eating psychopathology were associated with insecure attachment styles. Moreover, in keeping with the second study prediction, the current study found that elevated eating psychopathology was related to *both* anxious and avoidant attachment styles. These findings are inconsistent with previous studies within the general population, which have found either anxious attachment style (e.g., Armstrong & Roth, 1989; Eggert et al., 2007) or avoidant attachment style (Cole-Detke & Kobak, 1996;

Ramacciotti et al., 2001) to be more strongly related to unhealthy eating attitudes and behaviours. Rather these findings are consistent with Ward, Ramsay, Turnbull et al. (2000), Broberg et al. (2001) and Evans and Wertheim (2005) who reported that women with eating disorders were not characterised by a specific insecure attachment style, but by insecure attachment styles in general.

Similar to the findings of the aforementioned authors, the current findings collectively suggests that a *specific* insecure attachment style *may* not be synonymous with eating psychopathology amongst athletes; rather, an insecure attachment style is associated with elevated eating psychopathology in general. However, it should be noted that although both avoidant and anxious attachment styles were associated with increased levels of eating psychopathology, athletes' anxious attachment style was more so. It has been reported that anxious individuals fear rejection and abandonment, possess an excessive need for approval from others, as well as experience heightened distress if their close relationship members are unavailable and unresponsive (O'Kearney, 1996). Thus, it could be suggested that anxiously attached athletes may engage in unhealthy eating behaviours as means of gaining comfort and acceptance, or conversely, to generate concern and attention from significant others, including their coaches, teammates, and parents. Avoidantly attached individuals on the other hand, avoid forming close relationships with others, thus it is possible that they engage in such behaviours in a further attempt to reinforce these avoidant behaviours (e.g., creating a barrier by engaging in these behaviours and guarding themselves against forming close relationships).

The current results extended previous findings by demonstrating a multiple pathway between attachment styles and eating psychopathology. In particular, self-esteem, depression, and self-critical perfectionism were found to mediate the link between attachment styles and eating psychopathology. This finding suggests that eating disorders are likely to manifest themselves in athletes with an insecure attachment style by undermining their levels of self-esteem, depression, and self-critical perfectionism. This is in keeping with the traditional framework of attachment theory which postulates that while a secure attachment style is related to favourable cognitive and social development (Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000), positive affect and wellbeing (Mikulincer & Florian, 1998), an insecure attachment style is related to less favourable cognitive and social development, negative affect, and wellbeing (see Mikulincer & Shaver, 2007).

Although all three processes were found to significantly mediate the link between attachment styles and eating psychopathology, significant differences were found between the mediating effect of self-esteem, depression, and self-critical perfectionism. Specifically, self-esteem and depression were found to be better mediators than self-critical perfectionism, as they accounted for more of the indirect effect between attachment styles and eating psychopathology than self-critical perfectionism. These findings indicate that self-esteem and depression play a more central role in transferring the effect of attachment styles on eating psychopathology than self-critical perfectionism. Reasons as to why self-esteem and depression performed as better mediators than self-critical perfectionism were not examined, although a few can be speculated. Firstly, depression has been frequently highlighted to occur concomitantly with eating disorders (e.g., Casper, 1998; O'Brien & Vincent, 2003); therefore it is possible for that reason depression performed as a more robust mediator.

Secondly, self-esteem may have played a more central role in transferring the effect of attachment, as a result of athletes' internal working model. Bowlby (1969) proposed the concept of internal working models as a mechanism through which attachment styles can affect a person throughout life. Based on the early experiences with their primary caregiver, a *securely attached* individual internalises a positive internal model of self, possessing a strong sense of self worth, assertiveness, and autonomy. However, those who have developed an *insecure attachment style* tend to develop models of themselves as unworthy, and incompetent. Therefore it is possible that self-esteem played a more central role in transferring the effect between attachment insecurity and eating psychopathology, because the athletes' internal working model of self is negative. Moreover, Fairburn et al. (2003) in their transdiagnostic cognitive behavioural theory of eating disorders purported that dispositional interpersonal difficulties, such as attachment styles, are linked to eating disorders by undermining the individual's self-esteem. Finally, it has been suggested that self-esteem and depression may mediate the association between self-critical perfectionism and eating psychopathology (see Dunkley & Grilo, 2007). Therefore, it is possible that amongst athletes, self-critical perfectionism may not play a central role in transferring the effect of attachment styles to eating psychopathology, but may do so in transferring the effect of attachment styles to self-esteem and depression which are subsequently linked to eating psychopathology. However, these are speculations, and present an area for further research.

Despite the number of strengths of the present study (e.g., highly generalisable to the sport domain due to the large representative sample of male and female athletes, competing in a wide range of sports, investigating multiple mediators), limitations exist which warrant discussion, and should be addressed in future studies. First, the study was exploratory and cross-sectional in nature; therefore the conclusions about causality cannot be inferred. As attachment develops in infancy, it was hypothesised in the current study that attachment styles precede eating psychopathology; however, it is also possible that eating psychopathology may influence attachment styles, as attachment styles are not stable or fixed throughout life (Bowlby, 1973). This suggests that there may be bi-directional relations between the two. Therefore, future studies should seek to employ a prospective approach to determine the directionality of the relations observed in the current study and, more specifically, whether insecure attachment styles function as a predisposing factor for eating disorders, or is a result of the disorder. Second, the present study employed self-report measures of all study variables, therefore results are subject to social desirability and acquiescence response bias. Finally, the athletes' scores on the eating psychopathology measure were relatively healthy, therefore it is unclear whether the relationships observed in this study would extend to athletes with eating disorders. Moreover, a control group of non-athletes was not included, and as such it is also unclear whether these relations would extend to the general population. Thus, future studies should seek to replicate the present study with a sample of non-athletic controls, as well as with a clinical sample, in attempt to understand whether the current observed mechanisms involved in the eating psychopathology of athletes would extend to the general population, and patients with eating disorders.

The findings of the present study have important theoretical, practical, and clinical implications. First, they demonstrate that research into eating disorders in athletes may benefit from focusing on more psychosocial risk factors that are grounded in theory. Specifically, the emphasis in previous research conducted on athletes has been mainly placed on sport-specific risk factors such as injury, the sporting environment, and comments from coaches and other sport professionals (e.g., Hulley et al., 2007; Muscat & Long, 2008; Sundgot-Borgen, 1994). However, these findings fuel the notion that more generic, context free factors should also be examined as potential risk factors for the development of eating disorders amongst athletes, as the causes of eating disorders are multifaceted (Pike et al., 2008). Although the present study requires replication with a sample of non-athletes and

clinical sample of eating disordered patients, on the basis of the current findings we can speculate that the pattern of the underlying processes involved in athletes' eating psychopathology *may* be the same as non-athletes. Thus, parents, coaches, sport organisations, and NGBs need to be aware that problems associated with eating in athletes may not necessarily be a direct manifestation of their athletic participation, but a complex interaction of underlying psychological and social factors. While more research is warranted in this area before definitive recommendations can be made, it may be necessary in the mean time to design an education programme that highlights, among others, the important links between eating psychopathology and non-sport related issues, including self-esteem, depression, self-critical perfectionism, attachment difficulties, and relationship dynamics to parents, sport coaches, and other support staff who are in regular contact with athletes.

The current findings also have implications for the treatment of athletes. Clinicians working with athletes should be alerted to the possible presence of insecure attachment styles in their patients, and be careful to assess for such presence. Given the lack of research literature available on the topic, it is possible that attachment difficulties are not examined in athletes presenting with eating disorders. Thus, insecure attachment styles should be assessed, and treated accordingly if present in athletes. Moreover, it could be suggested that the assessment of attachment styles could also lead to more favourable treatment outcomes as attachment styles are said to influence clinical outcomes such as the content and the course of treatment process (Dallos, 2003), as well as the ability to form productive therapeutic alliance in treatment (Mallinckrodt, Coble, & Gantt, 1995). Given that a strong therapeutic alliance is often associated with improved outcomes in the treatment of many psychological disorders (e.g., Castonguay, Goldfried, Wisner, Raue, & Hayes, 1996), it would seem that the assessment for the presence of attachment styles may enable therapist to facilitate the development of a strong therapeutic alliance, which may subsequently influence treatment outcome (Turner, Bryant-Waugh, & Peveler, 2009). Finally, clinicians working with both athletes and non-athletes should be aware that insecure attachment styles (anxious attachment style more so) are likely to lower self-esteem, increase self-critical perfectionism and depressive symptoms, which may further exacerbate disordered eating. Thus, treatment interventions that focus on decreasing depressive symptoms and enhancing self-esteem (to a lesser extent focused on decreasing self-critical perfectionism) may lead to improvements in eating disordered symptoms.

5.5. Conclusion

In sum, the current findings have demonstrated links previously unexplored between attachment styles and eating psychopathology amongst a sample of athletes. The findings of this study provide invaluable information to those working closely with athletes, and demonstrate the need for further research into the psychosocial risk factors of eating psychopathology amongst athletes. The environment in which athletes operate is highly competitive, demanding, and stressful, and when coupled with psychosocial and personal factors as the ones examined in this study, it can potentially create conditions that place athletes at a greater risk for eating disorders. Thus the identification and understanding of such factors have enormous practical significance for the sport community, as it will allow athletes to perform in their sport uninhibited by the devastating effects of eating disorders.

6

Interpersonal Difficulties and Eating Psychopathology: Links to Situational and Dispositional Interpersonal Difficulties

Abstract

Objective: Based on the premise that interpersonal problems are closely associated with eating disorders, the present study sought to investigate the associations between situational interpersonal difficulties as captured by current relationship quality with parents and coaches, dispositional interpersonal difficulties as captured by social anxiety and loneliness and eating psychopathology amongst a sample of athletes and non-athletes. Moreover, the present study further explored the mediating role of self-critical perfectionism, self-esteem, and depression in such associations. **Method:** Athletes (N=152) and non-athletes (N=147) completed self-report instruments pertaining to relationship quality with mothers, fathers, and coaches (in the case of athletes), social anxiety, loneliness, self-critical perfectionism, self-esteem, depression, and eating psychopathology. **Results:** Correlational analyses revealed that perceived quality of relationship with the father, levels of social anxiety, and loneliness were related to eating psychopathology amongst athletes, while perceived relationship with both, the mother and the father, as well as levels of social anxiety and loneliness were related to eating psychopathology amongst non-athletes. However, such associations were indirect and mediated through depression for athletes, and through self-critical perfectionism, self-esteem and depression for non-athletes. Moreover, social anxiety and loneliness were found to be the only significant independent predictors of eating psychopathology amongst athletes and non-athletes. **Conclusion:** Overall, the findings of this study suggest that both situational and dispositional interpersonal difficulties hold the potential to influence eating psychopathology indirectly amongst athletes and non-athletes.

6.1. Interpersonal Difficulties and Eating Psychopathology: Links to Situational and Dispositional Interpersonal Difficulties.

Eating disorders are a chronic illness, which have been associated with substantial problems in interpersonal functioning (e.g., Bruch, 1973; Fairburn et al., 2003; Gull, 1874).

In particular, Fairburn et al. in their transdiagnostic theory of eating disorders proposed four examples as to how interpersonal difficulties may be related to eating disorders; family interpersonal dynamics, long-term interpersonal difficulties, interpersonal environments, and adverse life events. Due to inherent limitations and lack of clarity associated with the conceptualisation of family interpersonal dynamics and long-term interpersonal difficulties (see Schmidt & Treasure, 2006), these terms were broadened in this thesis to capture situational and dispositional interpersonal difficulties. Accordingly, situational interpersonal difficulties reflect an individuals' current perception of their relationship with significant others, and dispositional interpersonal difficulties reflect enduring, internal, trait-like characteristics which affect individuals' social functioning and sense of self.

Using these extended terms, and the other psychopathological processes (i.e., clinical perfectionism, self-esteem, and depression) proposed to be involved in both the development and maintenance of eating disorders by Fairburn et al., the previous study (see Chapter 4 and 5) examined the link between situational interpersonal difficulties as captured by relationship quality with significant others (i.e., parents, coaches, teammates), and dispositional interpersonal difficulties captured in terms of attachment styles. It was reported that both situational and dispositional interpersonal difficulties were associated with eating psychopathology amongst a sample of athletes. Specifically, the quality of both the parental and coach-athlete relationships in terms of social support and interpersonal conflict, and insecure attachment styles were related to athletes' eating psychopathology. However, such associations were indirect and mediated via athletes' self-critical perfectionism, self-esteem, and depression. Moreover, depression and self-esteem were highlighted to act as more salient mediators in the association between the dispositional interpersonal difficulty index, attachment styles, and eating psychopathology. Thus, the present study aimed to expand this line of research by further examining the link between both situational and dispositional interpersonal difficulties and eating psychopathology amongst athletes, as well as a control group of non-athletes.

Situational Interpersonal Difficulties

Bruch (1973) and Minuchin et al. (1978) first postulated that eating pathology stem from little or no encouragement of independence/autonomy, as well as an overprotective and intrusive family environment. Correspondingly, O'Kearney (1996) suggested that problems

with autonomy and separation from parents may be important factors in the development and maintenance of eating disorders. As such, these assertions have been further consolidated by empirical studies. In particular, several studies have found lack of autonomy (e.g., Bonne et al., 2003; Calam et al., 1990; Canetti et al., 2008) and more heavily involved and intrusive parental relationships (e.g., Hodes et al., 1999; McVey et al., 2002; Rorty et al., 2000; Rowa et al., 2001) to be associated with increased eating disordered symptomatology. However, many of the studies examining the association between parental relationships and eating disorders have often provided a narrow and limited understanding of the aforementioned association, as they have primarily focused on the mother-child relationship (e.g., Calam & Waller 1998; Pike & Rodin, 1991). Correspondingly, there is mounting recent evidence implicating the relationship with the father to eating disorders (see Calam et al., 1990; Jones et al., 2006; Meyer & Gillings, 2004; Rodgers & Chabrol, 2009), suggesting the need to incorporate both mothers and fathers in order to fully understand the association between parental relationships and eating disordered symptoms.

Dispositional Interpersonal Difficulties

McIntosh et al. (2000), in a detailed review of the role of interpersonal functioning in eating disorders, concluded that apart from problems related to family functioning, individuals with eating disorders also report enduring internal problems associated with social functioning and social interactions. Specifically, they highlighted that individuals with eating disorders demonstrate high levels of social anxiety, view themselves as socially incapable in comparison to others, and feel socially withdrawn and isolated. As such, social anxiety is considered to be common in patients with eating disorders (Bulik et al., 1991; Hinrichsen et al., 2003, 2007) and has been repeatedly suggested to precede the development of eating disorders (e.g., Kaye et al., 2004). Correspondingly, there is also a large body of research which suggests that social anxiety and eating disorders are integrally associated (e.g., Bulik et al., 1996; Striegel-Moore et al., 1993). Specifically, findings suggest that individuals who possess a high fear of negative evaluation and social anxiety report greater restrictive eating attitudes and body dissatisfaction (Gilbert & Meyer, 2003, 2005b), as well as greater bulimic psychopathology (Gilbert & Meyer, 2005a; Hinrichsen et al., 2004; Utschig et al., 2010).

Loneliness is considered the result of the individual's perceptions of being socially isolated (Pritchard & Yalch, 2009), as well as the result of the lack of social skills and competence to begin and develop close interpersonal relationships (Jones et al., 1982). It has been further reported that early onset of loneliness may act as an impetus in the development of eating disorders (Pritchard & Yalch, 2009), as well as contributing to relapses in eating disordered patients seeking treatment (Stewart, 2004). Moreover, levels of loneliness have been noted to be higher in patients with eating disorders in comparison to other psychiatric groups (Esplen et al., 2000). Correspondingly, a number of studies have demonstrated that increased feelings of loneliness led to increased consumption of food in restrained eaters (Rotenberg & Flood, 1999), a desire to binge in BN patients (Tuschen-Caffier & Vögele, 1999) as well as associated with greater drive for thinness and body dissatisfaction in males and females (Pritchard & Yalch, 2009).

While, it appears that both situational and dispositional interpersonal difficulties are a core component of eating disorders within the general population, in that they have been identified to serve as a risk factor for the development of the disorder (e.g., Johnson, Cohen, Kasen et al., 2002), act to maintain the disorder (e.g., Fairburn et al., 2003) and have been linked to treatment response and outcome (e.g., Hartmann et al., 2010; Pettersen & Rosenvinge, 2002), research within the athletic setting assessing such links is limited. Specifically, only a handful of studies have examined the associations between interpersonal difficulties and eating psychopathology, with the relationship between the coach and the athlete yielding the most attention (e.g., Biesecker & Martz, 1999; Jones et al., 2005; Muscat & Long, 2008; Thompson & Sherman, 1999b). Nevertheless, there is recent evidence to suggest that parents also affect athletes' eating attitudes (e.g., Scoffier et al., 2010; also see study in Chapter 4) as well as their athletic development and athletic experiences (e.g., Côté, 1999; Holt et al., 2008; Ullrich-French & Smith, 2006). However, it is not clear as to which parent exerts more influence on athletes (e.g., Brown, Frankel, & Fennell, 1989; Leff & Hoyle, 1995). Specifically, while some studies have suggested that same sex parents are more influential than cross-sex parents in athletes' initial involvement in sport (e.g., Snyder & Spreitzer, 1973; Weiss & Barber, 1995), other studies have reported fathers as more influential (Greendorfer & Lewko, 1978). Moreover, less is known about which parent exerts more influence beyond the initial stage of introducing the athlete to the sport.

While it is important to consider the relative importance of interpersonal difficulties in relation to eating disorders, it is also important to understand the processes which link interpersonal difficulties and eating disorders. Correspondingly, the three mediating variables of self-esteem, self-critical perfectionism, and depression have been highlighted to mediate the association between interpersonal difficulties and eating psychopathology in the studies presented in Chapter 4 and 5. Moreover, these mediating factors have also been shown to be related to both eating disorders (e.g., Dunkley, Blankstein et al., 2006; O'Brien & Vincent, 2003; Shea & Pritchard, 2007) and to the aforementioned situational and dispositional interpersonal difficulties (e.g., Frederick & Grow, 1996; Mayer, Muris, Meesters, & Zimmermann-van Beuningen, 2009; Wei, Shaffer, Young, & Zakalik, 2005; Wenk, Hardesty, Morgan, & Blair, 1994). Thus, the examination of these three mediators collectively could not only be key to understanding how eating psychopathology is related to interpersonal difficulties (e.g., whether interpersonal difficulties is directly or indirectly related to eating psychopathology), but the comparison of the relative strengths of self-esteem, depression and self-critical perfectionism as potential mediators in such association, will further help identify the most salient mediator(s), which will provide potentially useful targets for intervention.

Therefore, guided by the findings of Study 2 and other relevant empirical research, the present study aimed to further examine the association between situational interpersonal difficulties, dispositional interpersonal difficulties, and eating psychopathology. Thus, in an attempt to expand this line of inquiry, the present study examined the association between situational interpersonal difficulties as reflected by relationship quality with the mother, father and coach (in the case of athletes), dispositional interpersonal difficulties as captured by social anxiety and loneliness and eating psychopathology amongst athletes, as well as a control group of non-athletes. The inclusion of a control group of non-athletes was deemed important, as it would highlight whether the mechanisms involved in the eating psychopathology of athletes, are the same as non-athletes. Accordingly, if the mechanisms were found to be similar, this could promote the use of the interventions and treatment programmes readily available in the general population with athletes. It was expected that a mother-child relationship, father-child relationship, and a coach-athlete relationship marked by low autonomy support, and high-involvement would be associated with increased eating psychopathology. Based on previous findings (see Chapter 4), it was expected that the

strength of the association between the parent-athlete relationship and athletes' eating psychopathology would be larger than coach-athlete relationship and eating psychopathology, while the association between father-child relationship and eating psychopathology was expected to be stronger than the mother-child relationship amongst both athletes and non-athletes (e.g., Calam et al., 1990; Meyer & Gillings, 2004). It was also expected that social anxiety and loneliness would be positively related to both athletes' and non-athletes' eating psychopathology (e.g., Hinrichsen et al., 2003; Pritchard & Yalch, 2009).

The second objective of the current study was to examine which type of interpersonal difficulties was more predictive of athletes' and non-athletes' eating psychopathology. On the premise of the findings of the previous chapters, it was hypothesised that interpersonal difficulties as captured by social anxiety and loneliness would be stronger independent predictors of eating psychopathology amongst athletes and non-athletes. The final objective of the study was to examine the role of the intervening processes of self-critical perfectionism, self-esteem, and depression in the link between situational and dispositional interpersonal difficulties, and eating psychopathology. Based on previous findings (see Chapters 4 and 5) it was hypothesised that self-critical perfectionism, self-esteem, and depression would perform comparably as mediators in the link between situational interpersonal difficulties and eating psychopathology amongst athletes and non-athletes, while self-esteem and depression would account for more of the indirect effect in the association between social anxiety, loneliness, and eating psychopathology amongst athletes and non-athletes.

6.2. Method

Participants

Athletes. The athletic sample was composed of 152 British athletes (94 females and 58 males) with a mean age of 20.08 years ($SD=2.27$, range= 18-31) and a BMI of 22.59 ($SD=3.12$). Ninety-five percent of the athletes were British White, 0.70% was British Black, 0.70% was British Asian, and 4% were British Mixed-race. At the time of the study, 18% of athletes competed at the elite level (international and national), 23% competed at the county or regional standard, 18% competed at the club level, 35% competed for university teams, 0.70% specified Other (Pre-Novice) and 4.6% did not record their performance level. Athletes competed in a range of sports, with 60% of athletes competing in team sports such

as hockey, football, rugby, and netball, while the remaining 40% competed in individual sports such as skiing, equestrian, cycling, and triathlon. Athletes had been competing in their sport for an average of 8.77 years ($SD=4.31$) and trained on average 8.40 ($SD=6.03$) hours per week. Athletes had been training with their coach for an average of 1.71 years ($SD=2.83$) and trained on average 5.21 ($SD=3.95$) hours per week with their coach. Almost seventy-four percent of athletes identified their coach as male, while 25.7% of athletes identified their coach as female and 0.70% did not indicate the gender of their coach. Twenty percent of athletes indicated that their mother was the most influential parent on their sporting career, 41% reported that their father as the most influential, 10% reported both their mother and father as influential, and 28% selected neither of their parents as influential on their sporting career. A further 1% did not respond to this question.

Non-athletes. The non-athletic sample consisted of 147 non-athletes (109 females and 38 males) with a mean age of 20.78 years ($SD= 3.64$, range=18-39) and a BMI of 22.44 ($SD=4.89$). Eighty-four percent of the non-athletes were British White, 1.4% was British Black, 6.1% were British Asian, 2.1% were British Mixed-race and 6.1% did not specify their ethnicity. None of the non-athletes engaged in any organised sport, however 29% regularly attended the gym, spending an average of 3.57 ($SD= 1.83$, range 1-8 hours) hours per week training. Forty-six percent of the non-athletes highlighted their mother as the most influential parent in their life, while 13% reported their father as the most influential. A further 26% reported that both their mother and father were influential, 14% reported neither parent as influential in their life, and 0.70% did not respond to this question.

Measures

The following section provides a brief overview of the measures used in this study; for more detailed outline of these measures, the reader is referred to Chapter 2 of this thesis.

Demographic questionnaire. This questionnaire assessed the participants' age, gender, ethnicity, as well as the nature and extent of their athletic involvement.

Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008). For the purpose of the current study, only the global EDEQ score was used and exhibited above acceptable internal consistency, recording 0.94 with the current sample of athletes and 0.96 with the current sample of non-athletes.

Perceptions of Parents (POPS-the college-student scale; Robbins, 1994). For the purpose of the current study, only the subscales of Autonomy Support and Parental Involvement of the POPS were used. Additionally, in the case of athletes, the word mother/father was replaced with coach to assess their relationship quality with their coach. Scores are derived from averaging the sum of scores for each subscale, with higher scores reflecting higher levels of autonomy support and involvement in the relations. The internal consistency of each subscale was high across the current sample of athletes and non-athletes. In the case of athletes, the Cronbach alpha recorded 0.82 for mother autonomy support (POPS-MA), 0.78 for mother involvement (POPS-MI), 0.86 for father autonomy support (POPS-FA), 0.90 for father involvement (POPS-FI), 0.87 for coach autonomy support (POPS-CA), and 0.84 for coach involvement (POPS-CI). In the case of non-athletes, an internal consistency of 0.87 was recorded for mother autonomy (POPS-MA), 0.83 for mother involvement (POPS-MI), 0.87 for father autonomy (POPS-FA) and 0.87 for father involvement (POPS-FI).

The Brief version of the Fear of Negative Evaluation Scale (BFNE; Leary, 1983a; 1983b). The BFNE was used to measure levels of social anxiety. Scores are derived from the sum of scores, with higher scores reflecting greater social anxiety. High internal consistency scores were calculated for the current sample of athletes and non athletes, recording 0.92 and 0.93 respectively.

UCLA Loneliness Scale-Short (UCLA- Loneliness-Short; Allen & Oshagan, 1995). A short form of the revised UCLA Loneliness Scale consisting of 7 items was employed to measure how often individuals feel lonely in everyday life. Scores are derived from the sum of scores, with higher scores reflecting higher levels of loneliness. High internal consistency scores were calculated for athletes and non athletes, recording 0.90 for both groups.

Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978). For the purpose of the present study, only the 15 item self-criticism subscale (DAS-SC) was used. The internal consistency scores for the current sample of participants were high, recording 0.91 for athletes and 0.92 for non-athletes.

Rosenberg's Self Esteem Scale (RSES; Rosenberg, 1965). The RSES was employed to assess participants' levels of self-esteem. The internal consistency score was above acceptable, recording 0.91 for athletes and 0.90 for non-athletes.

Symptom Checklist 90R (SCL-90; Derogatis, 1983). For the purpose of the current study, only the depression subscale of the SCL-90R was used. The alpha reliability of the depression subscale (SCL-Depression) was high, recording 0.92 for athletes and 0.90 for non-athletes.

Data Analysis

The data were not normally distributed. Therefore, non-parametric tests were employed wherever possible. Preliminary analyses revealed significant gender differences in both athletes' ($U=2131.000$, $Z= 2.26$ $p <.05$) and non-athletes' ($U=1491.000$, $Z= 2.57$ $p <.01$) global EDEQ score, with female athletes ($M_{\text{femaleathlete}}=1.26$, $SD_{\text{femaleathlete}} =1.05$) and female non-athletes ($M_{\text{femalenon-athlete}}=1.51$, $SD_{\text{femalenon-athlete}} =1.31$) reporting more elevated eating psychopathology than their male counterparts ($M_{\text{maleathlete}}=0.88$, $SD_{\text{maleathlete}} =0.96$; $M_{\text{malenon-athlete}}=0.93$, $SD_{\text{malenon-athlete}} =0.92$). Thus, gender was used as a covariate for all analyses. Subsequent Mann Whitney tests were also conducted to detect any differences between athletes and non-athletes on their scores on BMI and all study variables; EDEQ, POPS, BFNE, UCLA-Loneliness, DAS-SC, RSES, and SCL-Depression. Second, one tailed Spearman Rho correlations were used to test the associations between POPS, BFNE, UCLA-Loneliness, DAS-SC, RSES, SCL-Depression and global EDEQ score. To compare the predictive role of POPS, BFNE and UCLA-Loneliness on both athletes' and non-athletes' global EDEQ score, two separate Hierarchical Multiple Regressions were conducted (one for athletes and one for non-athletes). As gender differences were detected in the global EDEQ scores for athletes and non-athletes, all Hierarchical Multiple Regression analyses were conducted controlling for gender. Finally, to assess the mediating effects of athletes' levels of DAS-SC, RSES, and, SCL-Depression between athletes' and non-athletes' POPS-MA, POPS-MI, POPS-FA, POPS-FI, POPS-CA (in athletes), POPS-CI (for athletes only), BFNE, UCLA-Loneliness and global EDEQ score, and to assess the specific indirect effect of each mediating variable in such relationship, the bootstrapping procedure as outlined by Preacher and Hayes (2004, 2008) was followed (see Chapter 2 for further details). All meditational

analyses were conducted using a macro for SPSS designed to assess indirect effects of multiple mediators on SPSS 17 (Preacher & Hayes, 2008).

6.3. Results

Descriptive Statistics

Table 6.1 presents the means (Ms), standard deviations (SDs), and results from the Spearman Rho used to assess the associations between athletes' and non-athletes POPS-MA, POPS-MI, POPS-FA, POPS-FI, POPS-CA (in the case of the athlete) POPS-CI (in the case of athletes), BFNE, UCLA-Loneliness, DAS-SC, RSES, SCL-Depression, and global EDEQ scores. It is clear from Table 6.1 that both the athletes' and non-athletes' global EDEQ score was considerably lower than previously reported for both athletes (e.g., Pernick et al., 2006) and non-athletes (Fairburn & Beglin, 1994; Mond et al., 2006). This suggests that the athletes and non-athletes in the current study reported healthy eating psychopathology. However, the lower global EDEQ score is probably a reflection of the inclusion of males and females in the present study, whereas the aforementioned previous studies have primarily used the EDEQ with females. The current sample of athletes' and non-athletes scores on the BFNE, and DAS-SC were higher than the previously published means amongst non-clinical samples (see Dunkley & Kyparissis, 2008; Leary, 1983b) and lower on SCL-Depression (see Jowett & Cramer, 2009). The non-athletes scores on the POPS- Autonomy Support (for both father and mother) and RSES are in line with previous reports (e.g., Gagné, 2003; Gilbert & Meyer, 2005a), while the athletes' scores are slightly higher on the POPS-Autonomy Support (mother and father) and lower on the RSES. Additionally, a significant difference was found between athletes and non-athletes on RSES ($U=9387.000$, $Z = 2.39$, $p<.05$), with non-athletes ($M= 19.76$, $SD=5.33$) reporting higher scores on the RSES than athletes ($M=17.67$, $SD=6.62$). No further significant differences were detected between athletes and non-athletes on their BMI, POPS-MA, POPS-MI, POPS-FA, POPS-FI, BFNE, UCLA-Loneliness, DAS-SC, SCL-depression and global EDEQ scores ($U\geq 9965.000$, $Z\leq 1.62$, $p > .05$ in all cases).

In the case of athletes, significant positive correlations were found between BFNE, UCLA-Loneliness, DAS-Self-Criticism, SCL-Depression, and global EDEQ score, while significant negative correlations were found between POPS-Father Autonomy and RSES and global EDEQ score. In addition, POPS-Father Autonomy was negatively correlated to DAS-Self-Criticism and SCL-Depression, while BFNE and UCLA-Loneliness were positively

Table 6.1. Ms, SDs, and Correlations between EDEQ, POPS, BFNE, UCLA-Loneliness, DAS-SC, RSES, and SCL-Depression scores for athletes and non-athletes

		Non-Athletes, n=147												<i>Ms</i>	<i>SDs</i>
Variables		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.		
	1. POPS-MA	1.0	.56**	.14*	.18*	-	-	-.23**	-.20**	-.22**	.22**	-.22**	-.20**	5.51	1.12
	2. POPS-MI	.62**	1.0	.26**	.39**	-	-	-.13	-.25**	-.23**	.19*	-.20**	-.21*	5.73	1.11
	3. POPS-FA	.43**	.33**	1.0	.75**	-	-	-.06	-.17*	-.20**	.09	-.10	-.12	5.13	1.28
	4. POPS-FI	.31**	.39**	.72**	1.0	-	-	-.17*	-.19*	-.20**	.17*	-.17*	-.19**	5.10	1.44
	5. POPS-CA	.24**	.21**	.16*	.21**	1.0	-	-	-	-	-	-	-	-	-
	6. POPS-CI	.19**	.25**	.13	.24**	.68**	1.0	-	-	-	-	-	-	-	-
Athletes	7. BFNE	.05	.14*	.03	.06	-.11	-.01	1.0	.34**	.54**	-.56**	.55**	.34**	39.61	11.13
n=152	8. UCLA-Loneliness	-.18*	-.19**	-.22**	-.27**	-.15*	-.19**	.25**	1.0	.38**	-.50**	.49**	.21**	13.44	4.79
	9. DAS-SC	-.15*	-.09	-.18*	-.26**	-.20**	-.05	.33**	.29**	1.0	-.49**	.41**	.33**	47.30	17.36
	10. RSES	-.01	-.10	.00	.05	.06	.04	-.08	-.17*	-.20**	1.0	-.64**	-.52**	19.76	5.33
	11. SCL-Depression	-.06	-.02	-.15*	-.14*	-.22**	-.18*	.52**	.52**	.34**	1.0	1.0	.44**	1.02	0.73
	12. EDEQ	.00	.03	-.16**	-.07	-.06	.06	.42**	.30**	.23**	-.17*	.42**	1.0	1.36	1.24
	<i>Ms</i>	5.69	5.84	5.39	5.33	4.80	4.65	38.69	12.77	44.39	17.67	1.09	1.11		
	<i>SDs</i>	0.80	0.92	1.08	1.37	1.09	1.22	10.26	4.55	15.35	6.62	0.77	1.03		

Note: ** p<.01; * p<.05 (1-tailed). Upper diagonal values are for non-athletes and lower diagonal values are for athletes. POPS-MA= mother autonomy, POPS-MI= mother involvement, POPS-FA= father autonomy, POPS-FI = father involvement, POPS-CA= coach autonomy, POP- CI = coach involvement, DAS-SC= self-criticism perfectionism; RSES= self-esteem; SCL-DEP= depression; EDEQ= Global EDEQ score.

correlated to DAS- Self-Criticism and SCL-Depression, but UCLA-Loneliness was negatively correlated to RSES. There were no significant correlations between POPS-Mother Autonomy, POPS-Mother Involvement, POPS-Father Involvement, POPS-Coach Autonomy, POPS-Coach Involvement and global EDEQ score, thus these variables were excluded from subsequent analyses.

In the case of non-athletes, significant positive correlations were found between BFNE, UCLA-Loneliness, DAS-Self-Criticism, SCL-Depression, and global EDEQ score, while significant negative correlations were found between POPS-Mother Autonomy, POPS-Mother Involvement, POPS-Father Involvement, RSES, and global EDEQ score. In addition, POPS-Mother Autonomy, POPS-Mother Involvement, and POPS-Father Involvement was negatively correlated to DAS-Self-Criticism and SCL-Depression, but positively correlated to RSES, while BFNE and UCLA-Loneliness were positively correlated to DAS-Self-Criticism and SCL-Depression but negatively correlated to RSES. There was no significant correlation between POPS-Father Autonomy and global EDEQ score amongst non-athletes, and as such this variable was eliminated from all subsequent analyses.

The Predictive Role of Interpersonal Difficulties in Eating Psychopathology

Athletes' gender $F(1, 150) = 4.99, p < .05$ was entered at Step 1 of the Hierarchical Multiple Regression, explaining 3% of the variance in athletes' global EDEQ score. After the entry of athletes' gender, their POPS-Father Autonomy, BFNE and UCLA-Loneliness scores were entered at Step 2. Doing so produced a significant model, where the total variance explained by the model as a whole increased to 22% $F(4, 147) = 10.59, p < .001$, indicating that POPS-Father Autonomy, BFNE and UCLA-Loneliness explained an additional 19% of the variance in athletes' global EDEQ score. However, further examination of the interpersonal difficulties variables revealed that only the dispositional interpersonal difficulties indices BFNE ($\beta = .33, p < .001$) and UCLA-Loneliness ($\beta = .20, p < .05$) significantly predicted athletes' global EDEQ score, with BFNE independently explaining 10% of the variance and UCLA-Loneliness independently explaining 4% of the variance.

Correspondingly, non-athletes' gender $F(1, 145) = 6.32, p < .05$ was entered at Step 1 of the Hierarchical Multiple Regression, explaining 4% of the variance in non-athletes' global EDEQ score. After the entry of non-athletes' gender, their POPS-Mother Autonomy,

POPS-Mother Involvement, POPS-Father Involvement, BFNE and UCLA-Loneliness scores were entered at Step 2, producing a significant model, whereby the total variance explained by the model as a whole increased to 25% $F(6, 140) = 7.89, p < .001$. This indicated that non-athletes' POPS-Mother Autonomy, POPS-Mother Involvement, POPS-Father Involvement, BFNE and UCLA-Loneliness explained an additional 21% of the variance in their global EDEQ score. However, further examination of the interpersonal difficulties variables revealed that only the dispositional interpersonal difficulties indices of BFNE ($\beta = .25, p < .01$) and UCLA-Loneliness ($\beta = .18, p < .05$) significantly predicted non-athletes' global EDEQ score. Specifically, non-athletes' BFNE score independently explained 5% of the variance and UCLA-Loneliness independently explained 3% of the variance.

In summary, these results suggest that dispositional interpersonal difficulties are more predictive of eating psychopathology than situational interpersonal difficulties amongst athletes and non-athletes. In particular, issues related to social anxiety and negative evaluation and social isolation and loneliness appear to be strong independent predictors of eating psychopathology.

The Mediating Effects of Self-Criticism Perfectionism, Self-Esteem, and Depression between Situational Interpersonal Difficulties and Eating Psychopathology

Mother autonomy and eating psychopathology amongst non-athletes. The predictor variable of non-athletes' POPS-Mother Autonomy, the covariate variable of gender and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score (see Figure 6.1), producing a dependent model summary of $F(5, 141) = 15.27, (p < .0001), R = .35, R^2 \text{ adjusted} = .33$. As shown by Figure 6.1, the association between POPS-Mother Autonomy and global EDEQ score was indirect. Controlling for the effect of gender ($b = .53, se = .20, p < .01$), the total and direct effect of non-athletes' POPS-Mother Autonomy on global EDEQ score were $-.28, p < .01$ and $-.12, p > .05$ respectively. The difference between the total and direct effect was again accounted for by the total indirect effect of the mediating variables, with a point estimate of $-.17$ and a bias-corrected 95% CI of $-.29$ to $-.07$ (see Table 6.2). Further examination of the specific indirect effects indicated that DAS-Self-Criticism, RSES, and SCL-Depression significantly contributed to the total indirect mediating effect, with RSES accounting for $-.07$, SCL-Depression accounting for $-.06$, and DAS -Self-Criticism accounting for $-.04$ of the total

effect. Examination of the pairwise contrasts revealed no significant differences in the magnitude of the mediating variables, suggesting that DAS-Self-Criticism, RSES, and SCL-depression contributed equally to the total indirect effect.

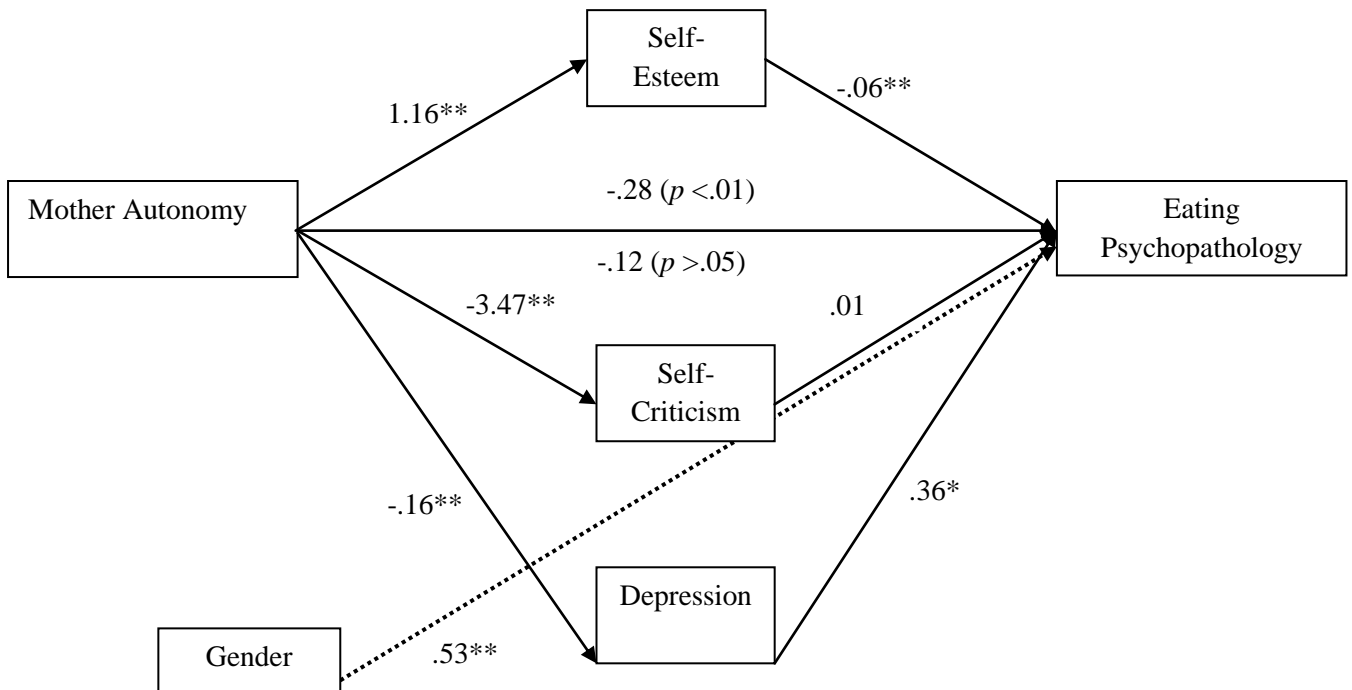


Figure 6.1. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' mother autonomy support and eating psychopathology; Unstandardised coefficients are presented, * $p < .05$, ** $p < .01$

Mother involvement and eating psychopathology amongst non-athletes.

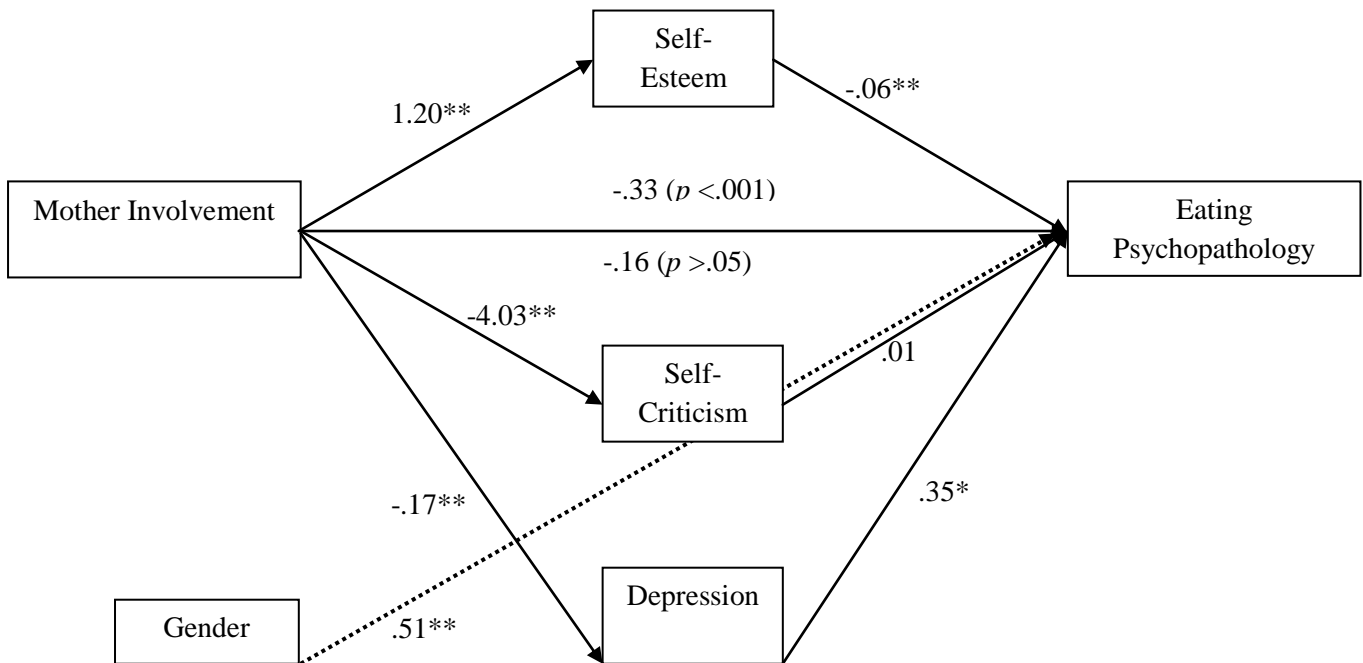


Figure 6.2. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' mother involvement and eating psychopathology. Unstandardised coefficients are presented, * $p < .05$, ** $p < .01$.

Table 6.2. Mediated effects of self-critical perfectionism, self-esteem, and depression between POPS-Mother and EDEQ amongst non-athletes

	Mothers' Autonomy Support				Mothers' Involvement			
	Bootstrapping BC 95% CI							
	Point estimate	<i>SE</i>	Lower	Upper	Point estimate	<i>SE</i>	Lower	Upper
	Indirect effects							
Self-Criticism	-.04	.02	-.10	-.00*	-.04	.03	-.11	-.00*
Self-Esteem	-.07	.03	-.15	-.02*	-.07	.03	-.14	-.02*
Depression	-.06	.04	-.16	-.00*	-.06	.04	-.16	-.00*
Total	-.17	.05	-.29	-.07*	-.17	.05	-.29	-.08*
	Contrasts							
Self-Criticism V Self-Esteem	.03	.04	-.04	.12	.03	.04	-.05	.12
Self-Criticism V Depression	.02	.04	-.05	.12	.02	.04	-.06	.12
Self-Esteem V Depression	-.01	.05	-.12	.09	-.01	.05	-.12	.10

Notes; BC= bias corrected CI; 5,000 bootstrap samples

* $p < .05$ (0 does not fall between the lower and upper BC 95% CI)

The predictor variable of non-athletes' POPS-Mother Involvement, the covariate of gender and the mediating variables of DAS-Self-Criticism, RSES, and SCL- Depression were regressed on the dependent variable of global EDEQ score (see Figure 6.2), producing a dependent model summary of $F(5,141) = 15.83$, ($p < .0001$), $R = .36$, R^2 adjusted = .34. As shown by Figure 6.2, the association between non-athletes' POPS-Mother Involvement and global EDEQ was indirect. Controlling for the effect of gender ($b = .51$, $se = .19$, $p < .01$), the total and direct effect of non-athletes' POPS- Mother Involvement on total EDEQ score were $-.33$, $p < .001$ and $-.16$, $p > .05$ respectively. The difference between the total and direct effect was again accounted for by the total indirect effect of the mediating variables, with a point estimate of $-.17$ and a bias-corrected 95% CI of $-.29$ to $-.08$ (see Table 6.2). Further examination of the specific indirect effects indicated that DAS-Self-Criticism, RSES, and SCL-Depression all significantly contributed to the total indirect mediating effect, with RSES accounting for $-.07$, SCL-Depression accounting for $-.06$, and DAS-Self-Criticism accounting for $-.04$ of the total effect. Examination of the pairwise contrasts revealed no significant differences in the magnitude of the mediating variables.

Fathers' autonomy and eating psychopathology amongst athletes.

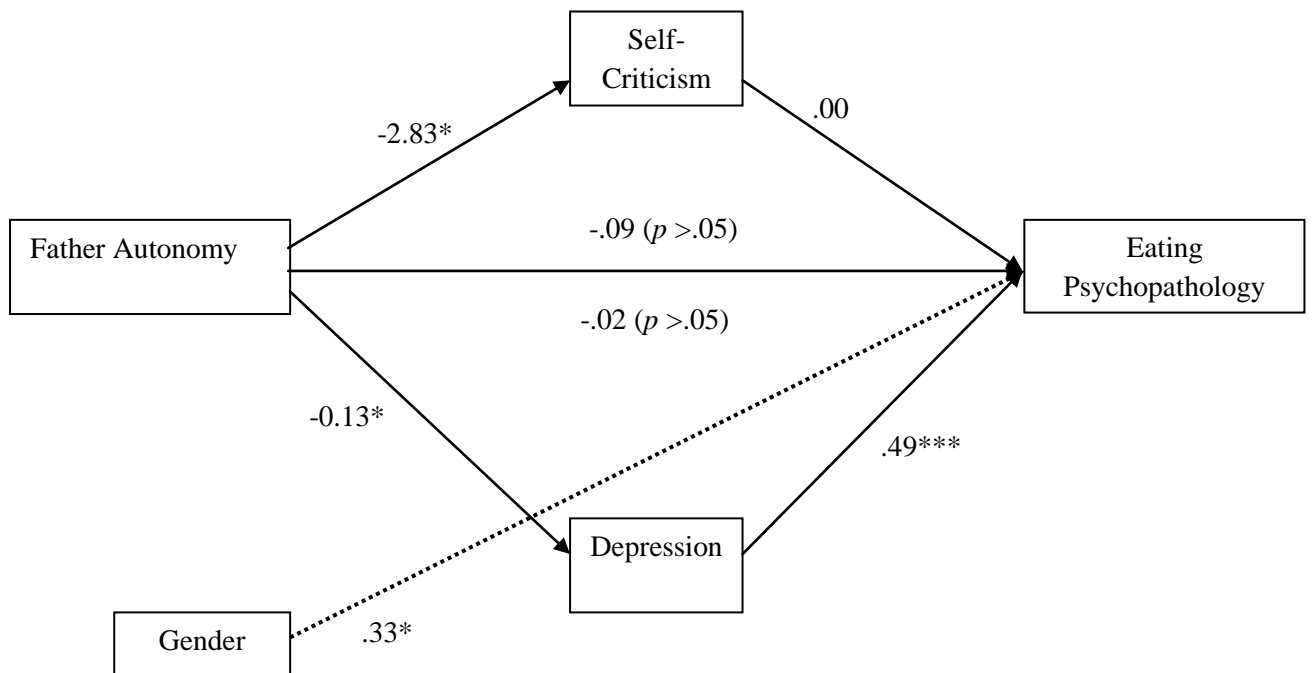


Figure 6.3. Self-critical perfectionism and depression as mediators between athletes' father autonomy support and eating psychopathology. Unstandardised coefficients are presented, * $p < .05$, ** $p < .01$, *** $p < .001$

The predictor variable of athletes' POPS-Father Autonomy, the covariate variable of gender, and the mediating variables of DAS-Self-Criticism, SCL-Depression were regressed

on the dependent variable of global EDEQ score (see Figure 6.3), producing a dependent model summary of $F(4,147) = 8.45$, ($p < .0001$), $R = .19$, R^2 adjusted = .16. As shown by Figure 6.3, the association between POPS- Father Autonomy and athletes' global EDEQ score was indirect. Controlling for the effect of gender ($b=.33$, $se= .16$, $p<.05$), the total and direct effect of athlete' perception of their fathers' autonomy on total EDEQ score were $-.09$, $p > .05$ and $-.02$, $p >.05$ respectively. The difference between the total and direct effect of POPS-Father Autonomy and global EDEQ score was accounted for by the total indirect effect of the mediating variables, with a point estimate of $-.07$ and a bias-corrected 95% CI of $-.15$ to $-.01$ (see Table 6.3). Subsequent examination of the specific indirect mediating effects revealed that only SCL-Depression significantly contributed to the total indirect mediating effect, accounting for $-.06$ of the total effect. However, examination of the pair-wise contrasts of the indirect effects revealed that there was no significant difference in the magnitude of the indirect mediating effects of DAS-Self-Criticism and SCL-Depression.

Fathers' involvement and eating psychopathology amongst non-athletes.

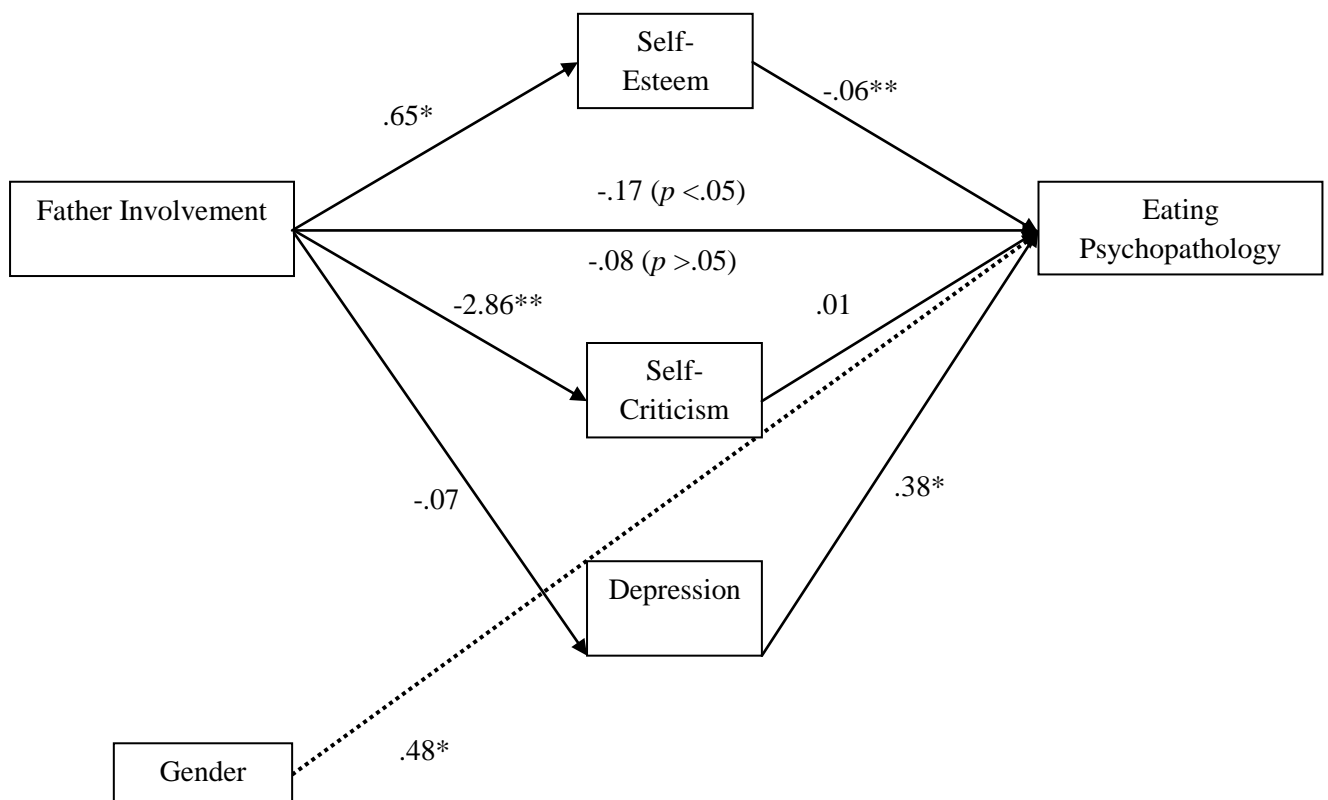


Figure 6.4. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' father involvement and eating psychopathology. Unstandardised coefficients are presented, * $p<.05$, ** $p<.01$

Table 6.3. Mediated effects of self-critical perfectionism, self-esteem, and depression between POPS-Father and EDEQ amongst athletes and non-athletes.

	Athletes' Father Autonomy Support				Non-athletes' Father Involvement			
	Bootstrapping BC 95% CI				Bootstrapping BC 95% CI			
	Point estimate	<i>SE</i>	Lower	Upper	Point estimate	<i>SE</i>	Lower	Upper
	Indirect effects							
Self-Criticism	-.01	.02	-.06	.01	-.03	.02	-.10	-.00*
Self-Esteem	-	-	-	-	-.04	.02	-.10	-.01*
Depression	-.06	.03	-.14	-.01*	-.02	.02	-.08	.00
Total	-.07	.04	-.15	-.01*	-.09	.04	-.19	-.02*
	Contrasts							
Self-Criticism V Self-Esteem	-	-	-	-	.01	.03	-.05	.08
Self-Criticism V Depression	.05	.04	-.01	.15	-.00	.03	-.06	.05
Self-Esteem V Depression	-	-	-	-	-.01	.03	-.08	.04

Notes; BC= bias corrected CI; 5,000 bootstrap samples

* p <.05 (0 does not fall between the lower and upper BC 95% CI)

The predictor variable of non-athletes' POPS-Father Involvement, the covariate of gender, and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score (see Figure 6.4), producing a dependent model summary of $F(5,141) = 15.07$, ($p < .0001$), $R = .35$, R^2 adjusted = .33. As shown in Figure 6.4, the association between POPS-Father Involvement and non-athletes' global EDEQ score was indirect. Controlling for the effect of gender ($b = .48$, $se = .20$, $p < .05$), the total and direct effect of non-athletes' POPS-Father Involvement on global EDEQ score were $-.17$, $p < .05$ and $-.08$, $p > .05$ respectively. The difference between the total and direct effect was again accounted for by the total indirect effect of the mediating variables, with a point estimate of $-.09$ and a bias-corrected 95% CI of $-.19$ to $-.02$ (see Table 6.3). Further examination of the specific indirect effects indicated that RSES and DAS-Self-Criticism significantly contributed to the total indirect mediating effect, with RSES accounting for $-.04$, and DAS-Self-Criticism accounting for $-.03$ of the total effect. Examination of the pairwise contrasts revealed no significant differences in the magnitude of these mediating variables.

In summary, mediation analyses revealed that the association between father autonomy and eating psychopathology amongst athletes was indirect, with depression highlighted as the only mediator contributing to the mediation. In the case of non-athletes, the associations between mother's autonomy support, mother involvement, and eating psychopathology were also indirect, with self-critical perfectionism, self-esteem, and depression all highlighted as equal robust mediators. In relation to non-athletes' perception of their father's involvement and eating psychopathology, the relationship was also indirect, with only self-esteem and self-critical perfectionism highlighted as mediators.

The Mediating Effects of Self-Criticism Perfectionism, Self-Esteem, and Depression between Dispositional Interpersonal Difficulties and Eating Psychopathology

Social anxiety and eating psychopathology. The predictor variable of athletes' BFNE, the covariate of gender, and the mediating variables of DAS-Self-Criticism and SCL-Depression were regressed on the dependent variable of global EDEQ score (see Figure 6.5), producing a dependent model summary of $F(4,147) = 10.83$, ($p < .0001$), $R = .23$, R^2 adjusted = .21. As shown by Figure 6.5, the association between athletes' BFNE and global EDEQ was complementary mediated by SCL-Depression. Controlling for the effect of

gender ($b=.28$, $se= .16$, $p>.05$), the total and direct effect of athlete' BFNE on global EDEQ score were $.04$, $p < .001$ and $.02$, $p < .01$ respectively.

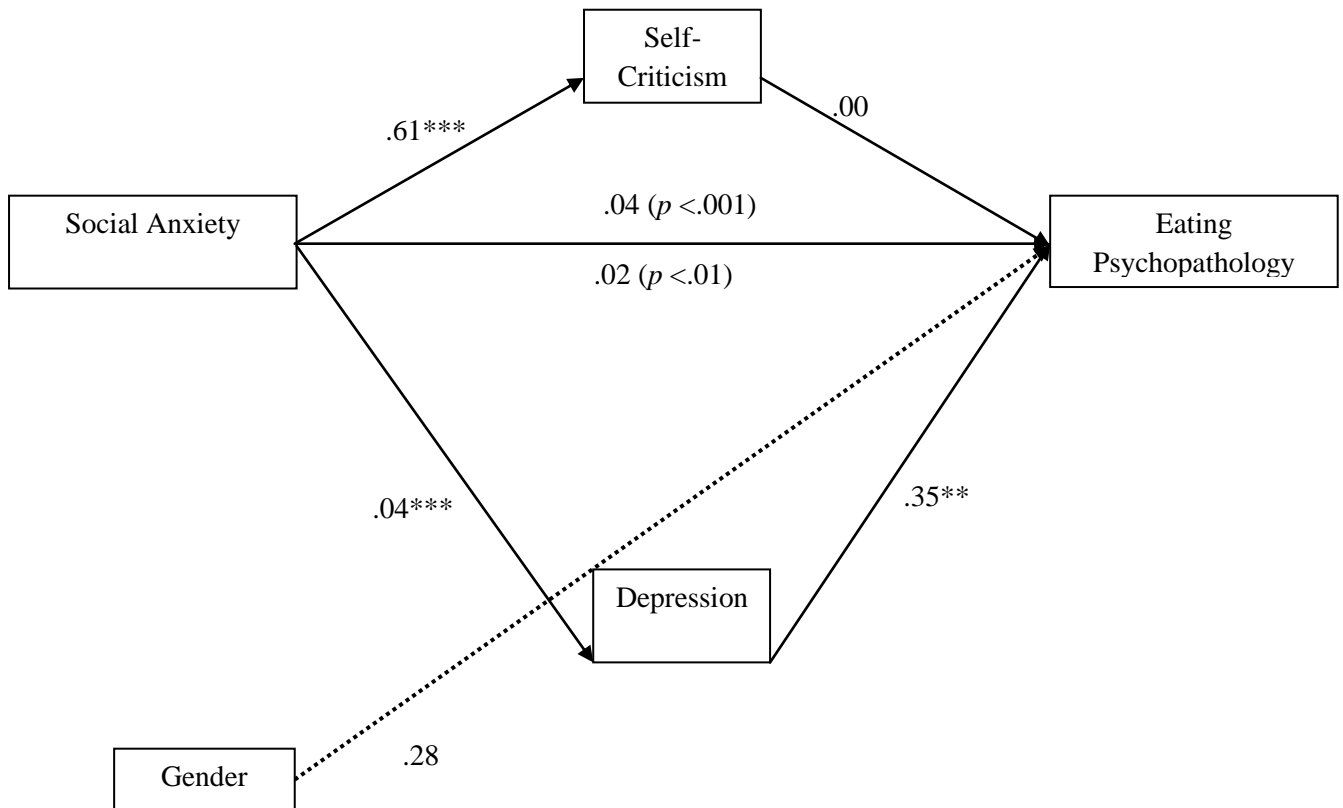


Figure 6.5. Self-critical perfectionism and depression as mediators between athletes' social anxiety and eating psychopathology. Unstandardised coefficients are presented, $**p<.01$, $***p<.001$.

The difference between the total and direct effect of BFNE and total EDEQ score was accounted for by the total indirect effect of the mediating variables, with a point estimate of $.01$ and a bias-corrected 95% CI of $.00$ to $.03$ (see Table 6.4). Subsequent examination of the specific indirect mediating effects revealed that only SCL-Depression significantly contributed to the total indirect mediating effect, accounting for $.01$ of the total effect. Examination of the pair-wise contrasts of the indirect effects revealed significant differences in the magnitude of the indirect mediating effects of DAS -Self-Criticism and SCL-Depression, with SCL-Depression significantly accounting for more of the indirect effect than DAS-Self-Criticism (see Table 6.4).

Second, the predictor variable of non-athletes' BFNE, the covariate variable of gender and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score (see Figure 6.6), producing a dependent model summary of $F(5,141) = 14.59$, ($p < .0001$), $R = .34$, R^2 adjusted = $.32$.

Table 6.4. Mediated effects of self-critical perfectionism, self-esteem, and depression between BFNE and EDEQ amongst athletes and non-athletes

	Athletes' Social Anxiety				Non-athletes' Social Anxiety			
	Bootstrapping BC 95% CI				Bootstrapping BC 95% CI			
	Point estimate	SE	Lower	Upper	Point estimate	SE	Lower	Upper
Indirect effects								
Self-Criticism	-.00	.00	-.01	.01	.01	.00	.00	.02*
Self-Esteem	-	-	-	-	.02	.01	.01	.03*
Depression	.01	.01	.00	.03*	.01	.01	.00	.03*
Total	.01	.01	.00	.03*	.04	.01	.02	.06*
Contrasts								
Self-Criticism V Self-Esteem	-	-	-	-	-.01	.01	-.02	.01
Self-Criticism V Depression	-.01	.01	-.03	-.00*	-.00	.01	-.02	.01
Self-Esteem V Depression	-	-	-	-	.00	.01	-.02	.03

Notes; BC= bias corrected CI; 5,000 bootstrap samples

* p <.05 (0 does not fall between the lower and upper BC 95% CI)

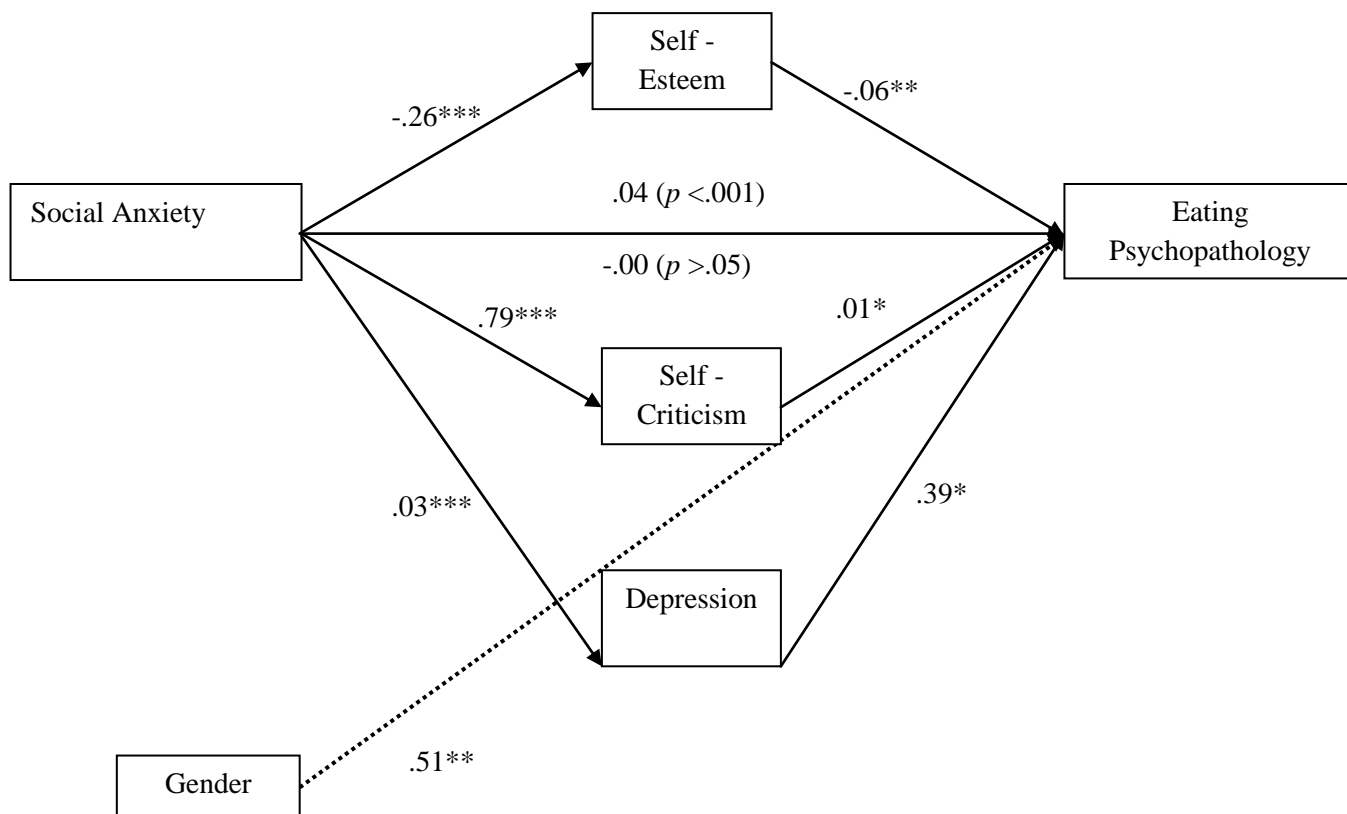


Figure 6.6. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' social anxiety and eating psychopathology. Unstandardised coefficients are presented, * $p < .05$, ** $p < .01$, *** $p < .001$

As shown in Figure 6.6, the association between non-athletes' BFNE and global EDEQ score was indirect. Controlling for the effect of gender ($b = .51$, $se = .20$, $p < .01$), the total and direct effect of non-athletes' BFNE and global EDEQ score were $.04$, $p < .001$ and $-.00$, $p > .05$ respectively. The difference between the total and direct effect was again accounted for by the total indirect effect of the mediating variables, with a point estimate of $.04$ and a bias-corrected 95% CI of $.02$ to $.06$ (see Table 6.4). Further examination of the specific indirect effects indicated that all mediators significantly contributed to the total indirect mediating effect, with RSES accounting for $.02$, SCL-Depression accounting for $.01$, and DAS-Self-Criticism accounting for $.01$ of the total effect. Examination of the pairwise contrasts revealed no significant differences in the magnitude of the mediating variables.

Loneliness and eating psychopathology. The predictor variable of athletes' UCLA-Loneliness, the covariate variable of gender and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score (see Figure 6.7) producing a dependent model summary of $F(5, 146) = 7.55$, ($p < .0001$), $R = .21$, R^2 adjusted = $.18$. As shown by Figure 6.7, the association between athletes' UCLA-Loneliness and global EDEQ score was indirect. Controlling for the effect of

gender ($b=.36$, $se=.16$, $p<.05$), the total and direct effect of athletes' UCLA-Loneliness on global EDEQ score were $.07$, $p < .001$ and $.03$, $p > .05$ respectively. The difference between the total and direct effect of UCLA-Loneliness and global EDEQ score was accounted for by the total indirect effect of the mediating variables, with a point estimate of $.04$ and a bias-corrected 95% CI of $.02$ to $.07$ (see Table 6.5). Subsequent examination of the specific indirect mediating effects revealed that only SCL-Depression significantly contributed to the total indirect mediating effect, accounting for $.04$ of the total effect. Examination of the pairwise contrasts of the indirect effects revealed significant differences in the magnitude of the indirect mediating effects of DAS-Self-Criticism, RSES and SCL-Depression, with SCL-Depression accounting for more of the indirect effect than DAS-Self-Criticism and RSES.

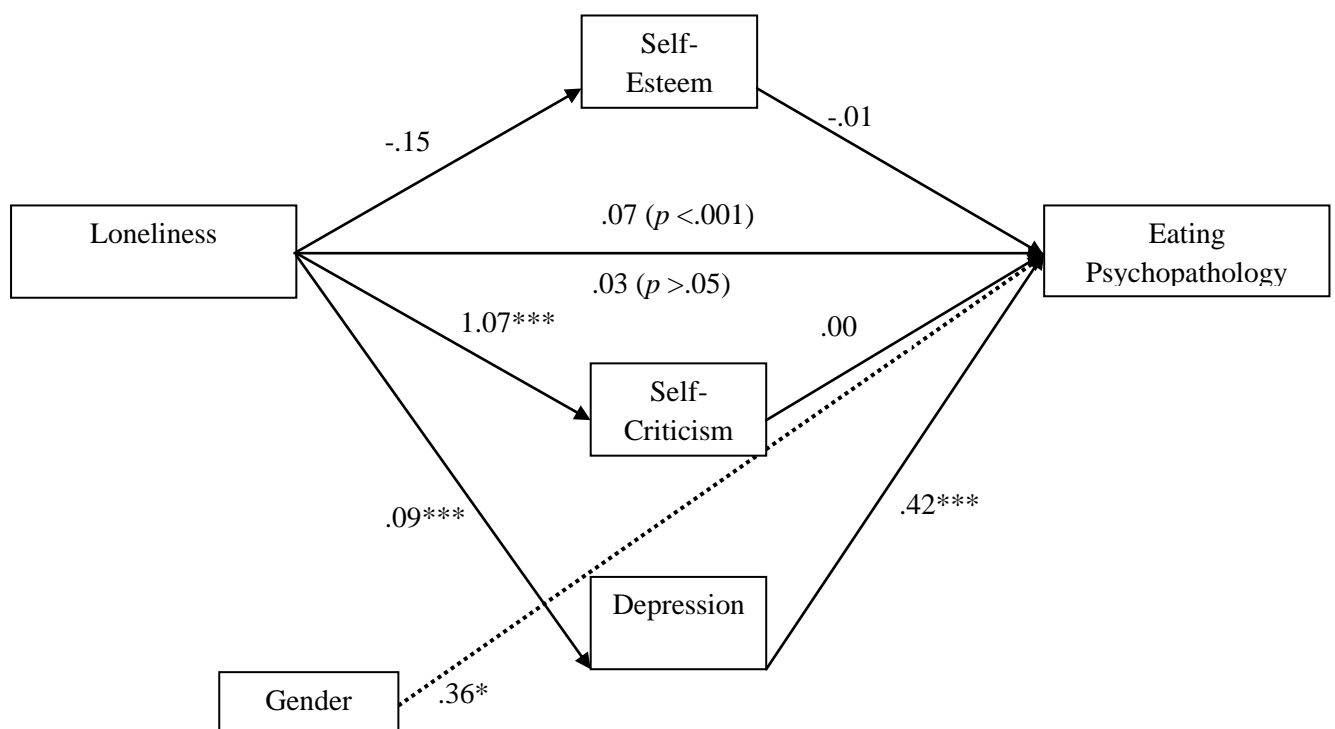


Figure 6.7. Self-critical perfectionism, self-esteem, and depression as mediators between athletes' loneliness and eating psychopathology. Unstandardised coefficients are presented, * $p<.05$, *** $p<.001$

Finally, the predictor variable of non-athletes' UCLA-Loneliness, the covariate variable of gender and the mediating variables of DAS-Self-Criticism, RSES, and SCL-Depression were regressed on the dependent variable of global EDEQ score (see Figure 6.8), producing a dependent model summary of $F(5,141) = 14.59$, ($p < .0001$), $R = .34$, R^2 adjusted = $.32$. As shown by Figure 6.8, the association between non-athletes' UCLA-Loneliness and global EDEQ score was indirect. Specifically controlling for the effect of gender ($b=.50$, $se=.21$, $p<.05$), the total and direct effect of non-athletes' UCLA-Loneliness

on global EDEQ score were $.09, p < .001$ and $-.00, p > .05$ respectively. The difference between the total and direct effect was again accounted for by the total indirect effect of the mediating variables, with a point estimate of $.09$ and a bias-corrected 95% CI of $.06$ to $.13$ (see Table 6.5). Further examination of the specific indirect effects indicated that all three mediators significantly contributed to the total indirect mediating effect, with RSES accounting for $.04$, SCL-Depression accounting for $.03$, and DAS-Self-Criticism accounting for $.02$ of the total effect. Examination of the pairwise contrasts revealed no significant differences in the magnitude of the mediating variables.

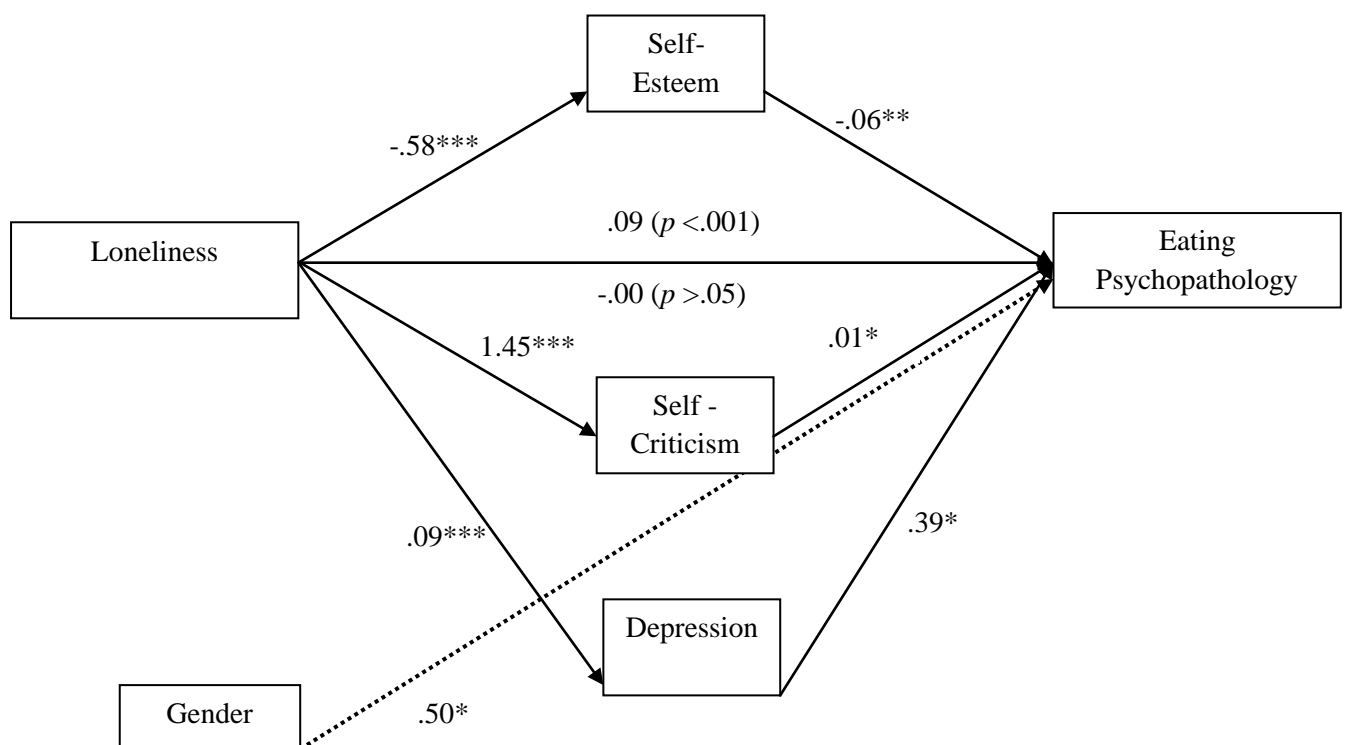


Figure 6.8. Self-critical perfectionism, self-esteem, and depression as mediators between non-athletes' loneliness and eating psychopathology. Unstandardised coefficients are presented, $*p < .05$, $**p < .01$, $***p < .001$.

In summary, the mediation analyses revealed that the association between social anxiety and eating psychopathology amongst athletes is both direct, and indirect, with depression complementary mediating the relationship, while the association between loneliness and eating psychopathology was indirect, with depression highlighted as the salient mediator. In the case of non-athletes, the association between social anxiety, loneliness, and eating psychopathology was indirect, with depression, self-esteem, and self-critical perfectionism all highlighted as salient mediators.

Table 6.5. Mediated effects of self-critical perfectionism, self esteem, and depression between UCLA-Loneliness and EDEQ amongst athletes and non-athletes

	Athletes' Loneliness				Non-athletes' Loneliness			
	Bootstrapping BC 95% CI							
	Point estimate	SE	Lower	Upper	Point estimate	SE	Lower	Upper
	Indirect effects							
Self-Criticism	.00	.01	-.01	.01	.02	.01	.00	.04*
Self-Esteem	.00	.00	-.00	.01	.04	.01	.01	.07*
Depression	.04	.01	.01	.07*	.03	.02	.00	.08*
Total	.04	.01	.02	.07*	.09	.02	.06	.13*
	Contrasts							
Self-criticism V Self-Esteem	-.00	.01	-.02	.01	-.02	.02	-.06	.01
Self-Criticism V Depression	-.04	.02	-.07	-.01*	-.02	.02	-.06	.02
Self-Esteem V Depression	-.04	.01	-.07	-.01*	.00	.03	-.05	.06

Notes; BC= bias corrected CI; 5,000 bootstrap samples

* p <.05 (0 does not fall between the lower and upper BC 95% CI)

6.4. Discussion

The current study attempted to examine the association between a range of interpersonal difficulties and eating psychopathology amongst a sample of British athletes and non-athlete controls via the mediating processes of self-critical perfectionism, self-esteem, and depression. Specifically, the first aim of the current study was to determine the link between situational interpersonal difficulties as captured by the current relationship quality with the mother, father, and coaches, dispositional interpersonal difficulties as captured by social anxiety and loneliness and eating psychopathology amongst a sample of athletes and a control group of non-athletes. Correlational analysis demonstrated that perceptions of the quality of relationships with parents, social anxiety, and loneliness were associated with eating psychopathology amongst athletes and non-athletes. Specifically, in the case of athletes, the levels of autonomy support received from fathers was negatively associated to eating psychopathology, while in the case of non-athletes, perceived levels of autonomy support and involvement from mothers and perceived levels of involvement from fathers was negatively associated to eating psychopathology. In addition, social anxiety and loneliness were positively associated to eating psychopathology amongst athletes and non-athletes. These current findings are in line with previous research studies that have linked situational interpersonal difficulties such as autonomy support and involvement, and dispositional interpersonal problems such as social anxiety and loneliness, to eating psychopathology (e.g., Calam et al., 1990; Hinrichsen et al., 2003; Pritchard & Yalch, 2009; Rorty et al., 2000).

Interestingly, the correlational findings highlighted that amongst athletes, only the quality of the relationship with the father was related to eating psychopathology (as reflected by perceived autonomy support); the quality of the relationship with the mother in terms of autonomy support and involvement was not associated to athletes' eating psychopathology. This is a novel finding given that the majority of previous studies conducted in the sport domain have not tended to focus on the separate influence of both set of parents on eating psychopathology, nor athletic development. Often studies have asked athletes to respond in relation to the most influential parent on their sporting career. The non-significant association between the quality of the relationship with the mother and eating psychopathology amongst athletes was unexpected, given that from the earliest conceptualisations of eating problems, lack of autonomy and over-involvement provided by

mothers to their child has been linked to eating disorders (e.g., Bruch, 1973; Minuchin et al., 1978). However, the current findings are consistent with the recent findings within the eating disorders literature that have highlighted the importance of the father-child relationships in eating disorders (e.g., Jones et al., 2006; Meyer & Gillings, 2004). Explanations for the sole association between the father-athlete relationship and eating psychopathology in the current study could be related to the fact that fathers are often highlighted as the agent introducing their children to sport, therefore it is possible that fathers still continue to be interested and influential on their child's athletic development and wellbeing, including athletes' eating behaviours (see Greendorfer & Lewko, 1978). In particular, 41% of athletes in the current study conveyed their father as the most influential parent in their sporting career. Thus, given that strong influential role of the father, athletes may be more concerned and sensitive about their interactions with their father than their mother, and engage in unhealthy eating behaviours to cope with the dysfunctional dynamics in the father-athlete relationship. Moreover, studies have suggested that cross-sex parents are more influential than same sex parents in childrens' eating attitudes and behaviours (e.g., Johnson, Cohen, Kasen et al., 2002). Therefore it is possible that the quality of the father relationship was related to athletes' eating psychopathology, given that almost 62% of the current sample consisted of female athletes. However, as these are speculations, they warrant further research.

It is also worthy of note that only autonomy support from fathers was linked to athletes' eating psychopathology, while father involvement was not. The current findings suggest that a father who provides the athlete with appropriate and meaningful information, and offers opportunities for the athlete to make their own choices and decision, may protect athletes from developing elevated eating psychopathology, while a father who is controlling and does not foster the development of autonomy in their child may contribute to unhealthy eating attitudes and behaviours. This could be related to the role of the father in the athletes' life. Specifically, Wylleman et al. (2007) suggested that parents' involvement in athletes' development decreases, as the athlete become more specialised and involved in their sport. For example, in the early stages of an athletic career, parents are said to invest a lot of time and are heavily involved in athletes' life in the following ways: emotional (i.e., showing interest), informational (i.e., being a practice partner) and tangible (i.e., transportation) However, as athletes progress into specialism and the latter stages of their career (i.e., developmental, elite level), athletes often move away from home, become more independent

(i.e., learning to drive), rely on other figures for support (i.e., teammates, friends, partners) meaning that the direct involvement with parents decreases. Specifically, they may not see or rely on their parents as often, and parents may not attend their games as frequently. Therefore, given that the father was perceived as the most influential parent in the athletes' sport career, it is possible that in the current sample of athletes, father involvement was not associated to athletes' eating psychopathology, as athletes were all aged 18 and above, probably live away from their parents (i.e., at university) and are able to drive, or are provided transport to games by other sources (i.e., by the university, clubs).

Contrary to expectations, the quality of the coach-athlete relationship was not related to athletes' eating psychopathology. This was unexpected, given that the coach is perceived as the most important person in an athletes' life (McAuley, 1996) and is inconsistent with previous research that have found significant associations between the quality of coach-athlete relationship and eating psychopathology (Scoffier et al., 2010; see Chapter 4), as well as retrospective accounts where coaches have been implicated in the onset of eating disorders (e.g., Jones et al., 2005). The discrepancy between the current finding and previous findings could be attributed to the manner in which relationship quality was measured. Specifically, Scoffier et al. employed a modified version of Sporting Friendship Quality Scale (SFQS; Weiss & Smith, 1999) which captures the quality of relationship in relation to the dynamics involved in the sport context to measure the quality of the coach-athlete relationship. The Perception of Parents (POPS; Robbins, 1994) was used to measure the quality of the coach-athlete relationship in the present study. However, the POPS makes no reference to sport-specific situations/dynamics. Thus it is possible that if the questionnaire was contextualised to reflect how supportive of autonomy, and involved the coaches were in relation to the athlete in sport, rather than in general, there may have been significant associations detected, due to the heavily contextualised relationship that is maintained between the coach and the athlete. The interactions between the coach and the athlete are likely to be restricted just to the sport/training domain and revolved around athletes' performance and athletic development, therefore it is possible that interactions related to sport and development in sport within the coach-athlete relationship may be more detrimental to athletes' eating psychopathology. However, this is speculation and presents an area for further research.

In contrast to athletes, the current findings found that for non-athletes, the quality of relationship with both the mother and the father were associated to eating psychopathology,

although via different routes. Specifically, a mother who inhibits the freedom to make independent choices, and a mother who is disinterested and aloof may contribute to the unhealthy eating psychopathology, while a father who is disinterested, distant, and uninvolved in their child's life is related to elevated eating psychopathology. Conversely, a mother who allows their child to make their own choices, and a mother and father who are involved in their child's life are likely to contribute to healthy eating psychopathology. The finding that both set of parents influence eating psychopathology is novel, given that the majority of the research that has examined the influence of family relationships on eating disorders has tended to focus on the mother-child relationship (see McIntosh et al., 2000 for a review). Moreover, studies that have examined the influence of both parents have found the father as more influential in eating psychopathology (e.g., Calam et al., 1990; Johnson, Cohen, Kasen et al., 2002; Meyer & Gillings, 2004; McVey et al., 2002). However, in general the current findings are compatible with previous studies which have implicated low autonomy support (e.g., Bonne et al., 2003; Canetti et al., 2008), and lack of parental-involvement in eating disorders (e.g., Johnson, Cohen, Kasen et al., 2002). While these findings, collectively, only partially supported the first hypothesis that situational and dispositional interpersonal difficulties are linked to eating psychopathology, they do further reinforce the overall link between interpersonal difficulties and eating psychopathology (e.g., Fairburn et al., 2003).

The second objective of the current study was to examine the type of interpersonal difficulties (e.g., situational or dispositional interpersonal difficulties) predictive of eating psychopathology. Results suggest that dispositional interpersonal difficulties are significantly stronger independent predictors of eating psychopathology amongst athletes and non-athletes. Specifically, social anxiety and loneliness independently accounted for 10% and 4% of the variance respectively in athletes, and 5% and 3% of the variance respectively in non-athletes. These findings support the study hypotheses and are also in line with previous research that has found links between social anxiety and eating disordered attitudes and behaviours (e.g., Bulik et al., 1996; Gilbert & Meyer, 2003, 2005a, 2005b; Hinrichsen et al., 2004, 2007), as well as between loneliness and disordered eating (e.g., Masheb & Grilo, 2006; Pritchard & Yalch, 2009). Taken together, the current findings suggest that dispositional interpersonal difficulties, and in particular social anxiety and loneliness, may be important processes involved in the eating psychopathology of both athletes and non-athletes.

Specifically, it can be suggested that disturbed eating serves as a maladaptive tool to help athletes and non-athletes manage their levels of social anxiety and loneliness. For instance, as individuals with high levels of social anxiety fear being negatively evaluated by others, seek social acceptance and attempt to preserve positive appraisals from others (Paxton et al., 1999), they may engage in disturbed eating behaviours in an attempt to gain acceptance and avoid being negatively evaluated. In return, such behaviours may reduce fears associated to negative evaluation when placed in social interactions. Similarly, athletes and non-athletes may also engage in unhealthy eating behaviours in an emotional response to their loneliness, but also as a way to cope with their levels of loneliness. It is possible that they engage in such behaviours because they believe that losing weight or becoming slimmer may result in better quality relationships with others, acceptance from peers, and possibly increased popularity in social networks (see Gerner & Wilson, 2005), or making them more appealing and therefore less lonely by gaining greater intimacy with the opposite sex (Rotenberg & Flood, 1999).

The findings also indicate that while social anxiety and loneliness were found to be comparable predictors of eating psychopathology amongst the athletic and non-athletic population, interestingly the strength of the association between social anxiety and eating psychopathology amongst athletes was stronger, as well as the variance that social anxiety accounted for being higher in athletes than non-athletes. This suggests that social anxiety may be more relevant to athletes than non-athletes. The strong association between social anxiety and eating psychopathology is not surprising given the context of the sport domain, where athletes are consistently placed in situations where they are judged (e.g., in competitions by spectators, judges and other competitors; during training with other athletes on the squad/team etc). Thus, it is possible that socially anxious athletes engage in unhealthy eating behaviours to reduce the anxiety associated with these situations. Moreover, given the small network (e.g., teams, squads) that exists within the sport domain, socially anxious athletes may be more susceptible to certain pressures from others that manifests in the sporting environment (i.e., engaging in unhealthy eating behaviours). Therefore, athletes may engage in such behaviours because it is considered 'normal' within the sporting environment, in an attempt to avoid being evaluated unfavourably by their fellow teammates/group, as well as to avoid exclusion from the group.

Within the athletic setting the construct of social anxiety has rarely been investigated. Rather a related construct termed social physique anxiety has been investigated in relation to eating problems. Social physique anxiety reflects the social evaluation of one's physique, and consequently a series of studies have found social physique anxiety and eating psychopathology to be closely associated amongst athletes (e.g., Haase, 2009; Haase & Prapavessis, 2001), with higher social physique anxiety related to elevated eating disorder symptoms. Thus, it is possible that the specific source that social anxiety stems from is related to fears of being negatively evaluated by others in relation to their physique amongst the current sample of athletes. Nonetheless, as the measure employed within the current study primarily focused on the broader components associated with social anxiety, it is unclear what the specific factor athletes are concerned about being negatively evaluated on. As such, this represents an area for future research to investigate, whether it is the construct of social anxiety in general (e.g., how they interact with others) that is associated to the eating psychopathology of athletes or whether there are more specific subcomponents of social anxiety (e.g., related to their physical appearance or to their performance) that is related to eating psychopathology.

Although it appears that the predictive function of interpersonal difficulties in eating psychopathology amongst both athletes and non-athletes lies more within dispositional interpersonal problems, such as social anxiety and loneliness, it is possible that there may be a synergistic interplay between the two types of interpersonal difficulties on eating psychopathology. Explicitly, the dispositional interpersonal difficulties indices may interact with situational interpersonal difficulties to influence eating psychopathology (also see Chapter 8). For example, dispositional interpersonal difficulties such as high levels of social anxiety and loneliness may stem from situational interpersonal difficulties such as poor quality relationships, or dispositional interpersonal difficulties such as high levels of social anxiety and loneliness may prevent individuals from forming positive relationships. Correspondingly, this interplay between the study variables has been documented in a series of studies. Stewart (2004) reported that the association between loneliness and eating disorders may evolve from poor relationship dynamics with parents. Equally, studies also suggest that social anxiety is associated with exposure to adverse parenting styles (e.g., Enns, Cox, & Clara, 2002; Kimbrel et al., 2008). Moreover, Wonderlich-Tierney and Vander Wal (2010) demonstrated that elements of situational interpersonal difficulties reflected in social

support from family and friends to moderate the association between social anxiety and eating disordered symptoms, with a stronger association between social anxiety and eating disorder symptoms amongst women who perceived lower levels of support from such sources. Hinrichsen et al. (2007) further added that social anxiety in eating disorders was associated to accounts of emotionally inhibiting fathers. However, as the aforementioned findings were collated from a sample of non-athletes, further research is needed to examine whether such interplay would be relevant to athletes' eating psychopathology. Moreover, as this is the first study to compare the predictive strength of a range of interpersonal difficulties, it only provides some preliminary evidence. Therefore, further research is required, before one can rule out the predictive influence of situational interpersonal difficulties on eating psychopathology.

The final objective of the present study was to evaluate the processes through which situational and dispositional interpersonal difficulties influence eating psychopathology. In the case of athletes, the only process to significantly contribute to transferring the effect of both situational and dispositional interpersonal difficulties to eating psychopathology was depression. Specifically, depression fully accounted for the link between father autonomy, loneliness, and eating psychopathology, as well as partially accounting for the link between social anxiety and eating psychopathology. Moreover, results revealed that depression was a more salient mediating variable than self-esteem and self-critical perfectionism in such associations (not in the case of father autonomy). In the case of non-athletes, self-critical perfectionism, self-esteem, and depression were found to mediate the link between mother autonomy, mother involvement, social anxiety, loneliness, and eating psychopathology, while only self-critical perfectionism and depression mediated the link between father involvement and eating psychopathology. Results further revealed that one mediating processes was not more salient than the others, rather they all equally mediated the association between situational and dispositional interpersonal difficulties and eating psychopathology amongst non-athletes. This was unexpected and is only partially consistent with the study's hypotheses and previous research (see Chapter 4 and 5). Specifically, study 2 of this thesis suggested that the psychopathological processes of self-critical perfectionism, self-esteem, and depression all contribute to transferring the effects between situational and dispositional interpersonal difficulties and eating psychopathology, with self-esteem and depression acting

as more salient mediators in the link between dispositional interpersonal difficulties and eating psychopathology.

Although reasons for these unexpected results were not examined, a few reasons can be speculated. Firstly, the eating disorder literature suggests that depression and eating disorders are co-morbid (e.g., O'Brien & Vincent, 2003), it is possible for that reason, that depression performed as a more robust mediator than self-esteem and self-critical perfectionism in the eating psychopathology of athletes. Similarly, it has been suggested that depression may mediate the association between self-critical perfectionism, and eating psychopathology, while self-esteem is considered to mediate the link between self-critical perfectionism and depression (Dunkley & Grilo, 2007). Therefore, it is possible that amongst athletes, self-critical perfectionism and self-esteem may not play a central role in transferring the effect of interpersonal difficulties to eating psychopathology. Rather, self-critical perfectionism may mediate the link between interpersonal difficulties and depression, while self-esteem may mediate the link between self-critical perfectionism and depression, with depression subsequently linked to eating psychopathology. Finally, as the processes examined in the current study were guided by the evidence based theory of Fairburn et al. (2003), which explains the mechanisms behind eating disorders amongst the general population, it is possible that self-critical perfectionism, self-esteem, and depression were more related to the eating psychopathology of non-athletes than athletes, as the theory is primarily based on research conducted on non-athletes. Nonetheless, these explanations are purely speculative and present an area for further research.

Taken together, the current findings provides evidence to suggest that the mechanisms involved in the eating psychopathology of athletes are similar to those of non-athletes (e.g., social anxiety, loneliness, depression), however, there are some subtle differences that distinguish athletes from non-athletes. For example, while situational interpersonal difficulties were found to be indirectly related to eating psychopathology amongst both sets of populations, it was only the level of autonomy support received from fathers that affected eating psychopathology in the case of athletes, but in non-athletes, mother-autonomy, mother involvement, and father involvement influenced eating psychopathology. Moreover, while the strengths of such links were comparable between athletes and non-athletes, the associations between the mediating variables of self-critical perfectionism, self-esteem, and eating psychopathology were stronger amongst non-athletes than athletes. This suggests that

these mediators may be more involved in the eating psychopathology of non-athletes than athletes. This is further collaborated by the indirect effects, where depression was revealed as the only significant mediator in athletes' eating psychopathology, while self-critical perfectionism, self-esteem, and depression were found to be significant contributors for non-athletes. Thus, it appears that there may be other potential mediators involved in the eating psychopathology of athletes. Although further research is required comparing the potential risk factors of eating psychopathology amongst athletes and non-athletes before definitive conclusions can be formed, nonetheless it seems that athletes may benefit from similar treatment, interventions, prevention strategies, and programmes as non-athletes. However, it is advisable that given the subtle differences that exist, such treatment, interventions, prevention strategies and programmes targeting athletes and non-athletes are tailored to accommodate the aforementioned unique differences. Treating athletes and non-athletes completely the same may result in athletes not getting the specific help they need.

Despite the notable strengths of the study (e.g., examining the mother-child and father-child relationship, using a control group of non-athletes, employing multiple mediators), the current findings should be interpreted in the context of its limitations. First, while it provides an initial insight into the links between a range of interpersonal difficulties and eating psychopathology amongst athletes and non-athletes, the design of the study is nevertheless cross-sectional. Thus, conclusions about causality cannot be drawn. Therefore future studies should seek to employ a prospective approach to determine the directionality of the relations observed in the current study and, more specifically, whether interpersonal difficulties function as a predisposing factor for eating disorders, or is a symptom of the disorder. Secondly, although significant associations were detected between the study variables, the magnitude of the effects presented were modest and in most cases small. Moreover, as the present sample consisted primarily of university level, British White females, with low levels of eating disordered psychopathology, the results may not generalise well to older, male, clinical, or ethnic minority populations. Therefore, future studies should seek to replicate the study with a more diverse population, as well as with a clinical sample.

Despite these limitations, the current research provides some useful preliminary information regarding the links between a range of situational and dispositional interpersonal difficulties and eating psychopathology, as well as holding some important theoretical, practical and clinical implications. First, the current findings demonstrate that the patterns of

the underlying processes involved in athletes' eating psychopathology resemble that of non-athletes. This is the first study to the author's knowledge to compare the mechanisms behind athletes and non-athletes' eating psychopathology. Secondly, the current findings, in corroboration with the findings of Study 2 of this thesis, further reinforce the notion that there is a multiple pathway between interpersonal difficulties and eating psychopathology, as well as the central role of self-critical perfectionism, self-esteem, and depression as mediators in non-athletes and depression in athletes. Furthermore, the current findings illustrate the importance of examining interpersonal difficulties in athletes' eating psychopathology, and in particular the role of social anxiety, given its' direct link. Finally, the present findings demonstrated the influence of the mother and the father in eating psychopathology, and in particular the dual role of both the mother and father in non-athletes' eating psychopathology and the role of the father in athletes' eating psychopathology. Studies examining the role of the father have been over-looked in favour of the mother-child relationship within the general population, and as such the present findings suggest that not only do both parents hold the potential to influence non-athletes' eating psychopathology, they do so in varying manners.

With regard to clinical practice, given the predicting role of dispositional interpersonal difficulties, in particular social anxiety and loneliness, on eating psychopathology, the present findings suggest that the presence of dispositional interpersonal difficulties (i.e., social anxiety and loneliness) should not only be given importance over other situational interpersonal difficulties, but also assessed when working with eating-disordered patients (athletes and non-athletes). They should be examined even more comprehensively amongst athletes who report depressive symptoms and non-athletes who exhibit low self-esteem, high self-critical evaluations, and depressive symptoms. The current findings further suggest that parents, coaches, sport organisations, and NGBs need to be attuned to the fact that problems associated with eating in athletes may not necessarily be a direct manifestation of their athletic participation, but a complex interaction of underlying psycho-social issues. Thus future prevention programmes (for both athletes and non-athletes) may benefit from including some cognitive-behavioural techniques such as cognitive restructuring or thought stoppage in an attempt to reduce potential social anxiety fears (Hinrichsen et al., 2003, 2004; Utschig et al., 2010). For example, by getting individuals to focus on specific fears that they hold in relation to social interactions, and changing the way they view such interactions, their levels of anxiety may decrease. Furthermore, any

prevention and treatment programmes should also focus on reducing depressive symptoms in athletes, and reducing both depressive and self-critical evaluations, as well as increasing levels of self-esteem in non-athletes, as these variables appear to play an important role between interpersonal difficulties and eating psychopathology. Thus, by targeting the aforementioned mediating variables, it may potentially lead to improvements in eating psychopathology, as well as in interpersonal difficulties. Finally, on the premise of the present findings it may also be beneficial that situational interpersonal difficulties relating to relationship quality are also examined, although to a lesser extent. In particular, the quality of the father-athlete relationship when working with athletes with eating disorders, and the quality of both the mother and father-child relationship amongst a non-athletic sample.

6.5. Conclusion

In summary, the results of the present study indicate that the mechanisms involved in eating psychopathology are relatively similar for athletes and non-athletes. Additionally, although a range of interpersonal difficulties were related to eating psychopathology amongst athletes and non-athletes, dispositional interpersonal difficulties (i.e., social anxiety and loneliness) appear to be more so. Therefore, future research examining athletes' eating psychopathology should focus on the investigation of dispositional interpersonal difficulties and in particular social anxiety and loneliness. For example, it is not clear whether athletes' fears about negative evaluation are rooted in specific sources (e.g., spectators, competitors, judges, coaches, peers) or specific fears (e.g., about their weight, about their physical appearance, about their performances). Thus, future studies should seek to explore which group influences athletes' levels of social anxiety, as well as the specific area that athletes are fearful of being negatively judged on (e.g., appearance, performance, and social interactions). Although, it is difficult to be conclusive, given the relatively small research conducted on the psychosocial risk factors of eating disorders in the athletic population, it appears that psychosocial factors have the potential to be critical risk factors for eating disorders in athletes. Accordingly, future research should attempt to incorporate these factors in addition to contextualised sport specific risk factors to fully understand the aetiology of eating disorders amongst athletes.

STUDY 4

The Prospective Role of Interpersonal Difficulties on Athletes' Eating Psychopathology

Difficulties in interpersonal functioning have been linked to eating disorders since the earliest conceptualisation of the disorder (e.g., Bruch, 1973; Gull, 1874). However, while there is evidence to suggest that both situational and dispositional interpersonal difficulties are an important correlate of eating disorders, its status as a risk factor remains limited (see Jacobi, Hayward et al., 2004). Only a handful of studies have found situational and dispositional interpersonal difficulties to be related to the onset of eating disordered symptomatology (see Burge et al., 1997; Calam & Waller, 1998; Johnson, Cohen, Kasen et al., 2002). The establishment of both situational and dispositional interpersonal difficulties as a risk factor is important at both a theoretical and practical level. Specifically, it will further develop the current limited knowledge-base in relation to which type of interpersonal difficulties (i.e., situational or dispositional) is more predictive of eating psychopathology, but also aid the development of appropriate treatments, education, and prevention programmes designed to reduce the risk of eating disorders. Therefore, the central focus of Chapter 7 was to examine the predictive role of situational interpersonal difficulties as captured by relationship quality with significant others (i.e., parent, coach, and teammate) and dispositional interpersonal difficulties as captured by attachment styles in athletes' eating psychopathology over a 6 month period, while controlling for athletes' initial eating psychopathology.

7

The Prospective Role of Interpersonal Difficulties in Athletes' Eating Psychopathology

Abstract

Objective: The present study sought to determine the predictive role of interpersonal difficulties on eating psychopathology amongst British athletes. **Method:** One hundred and twenty-two athletes completed a multi-section questionnaire that measured eating psychopathology, negative and positive aspects of the quality of relationships with parents, coaches, and teammates, as well as attachment styles twice over a 6-month period. **Results:** Partial correlations revealed that while controlling for baseline eating psychopathology, only the quality of the relationship with coach and teammates were related to athletes' eating psychopathology 6 months later. Subsequent Hierarchical Multiple Regression analyses demonstrated that athletes' T2 eating psychopathology was only independently predicted by perceived levels of conflict in the coach-athlete relationship. **Conclusions:** The current findings provide evidence to suggest that conflict with the coach is a risk factor for eating disorders amongst athletes. Therefore, based on these findings, it would seem appropriate to make the sporting communities aware of the salient role that this interpersonal relationship plays on athletes' eating psychopathology.

7.1. The Prospective Role of Interpersonal Difficulties in Athletes' Eating Psychopathology

Difficulties in interpersonal functioning have been linked to the development and maintenance of eating disorders since the earliest conceptualisation of the disorder (Bruch, 1973; Gull, 1874). In conjunction with the documented effectiveness of Interpersonal Therapy in the treatment of BN (e.g., Fairburn, Jones, Peveler, Hope, & O'Connor, 1993) and Family Therapy for adolescent AN (e.g., Eisler, Simic, Russell, & Dare, 2007), there is compelling evidence to suggest that interpersonal issues and problems are linked eating disordered symptomatology. Accordingly, both situational and dispositional interpersonal difficulties have been linked to eating disorders. Specifically, the review of the literature has

shown endless support for such links cross-sectionally, with situational interpersonal difficulties such as dysfunctional relationship dynamics, and dispositional interpersonal difficulties such as insecure attachment styles often implicated as potential antecedents (see Jacobi, Hayward et al., 2004; McIntosh et al., 2000 for a review). However, due to the research design of such studies, it is unclear whether both situational and dispositional interpersonal difficulties are a cause of the disorder or merely a symptom of the disorder.

While much of this limited understanding can be attributed to the lack of studies moving beyond establishing the precedence of interpersonal difficulties in eating disorders (see Jacobi, Hayward et al., 2004; Striegel-Moore & Bulik, 2007), of the studies that have examined the precedence of both situational and dispositional interpersonal difficulties, the findings generated have been equivocal. Specifically, some studies have found dysfunctional relationship dynamics with parents and close others (e.g., Calam & Waller, 1998; Beato-Ferández et al., 2004; Johnson, Cohen, Kasen et al., 2002; Stice & Whitenton, 2002; Thelen et al., 1990,1993) and insecure attachment styles (e.g., Burge et al., 1997) to be related to the onset of eating disordered symptoms, others on the other hand have not (e.g., Attie & Brooks-Gunn, 1989; Button et al., 1996; Ferriter et al., 2010; Graber et al., 1994; McKnight Investigators, 2003; Nicholls & Viner, 2009). As a result, both situational and dispositional interpersonal difficulties (i.e., family functioning, family dynamics, and insecure attachment styles) have been largely rendered as a '*correlate*' of eating disorders rather than a '*risk factor*' (Jacobi, Hayward et al., 2004). Moreover, Schmidt and Treasure (2006) have argued that very little detail is available on which aspects of interpersonal difficulties (i.e., situational or dispositional) are important to the development (and maintenance) of eating disorders.

As the link between eating disorders and interpersonal difficulties continue to be widely researched among the general population (e.g., Hartmann et al., 2010), such associations within the athletic setting remain fairly limited. In particular, there are a small number of studies that have examined the associations between interpersonal factors such as the quality of the parent-athlete relationship (Scoffier et al., 2010), coach-athlete relationships and coach interpersonal behaviours (Jones et al., 2005; Scoffier et al., 2010; Thompson & Sherman, 1999b), teammate-athlete relationships (Rosen et al., 1986; Williamson et al., 1995) and athletes' eating psychopathology. Collectively these studies correspond with the descriptive findings of the general population, with poor quality parental, coach, and

teammate- athlete relationships all said to promote the risk of eating disorders amongst athletes.

Therefore, the main aim of the present study was to move beyond establishing the statistical association between interpersonal difficulties and eating psychopathology, and attempt to determine its precedence within the sporting context. Specifically, this study examined the predictive role of situational interpersonal difficulties as reflected in relationship quality with significant others (i.e., parents, coaches, and teammates) and dispositional interpersonal difficulties as reflected by attachment styles in the eating psychopathology of athletes over a six month period. It was first hypothesised that both situational and dispositional interpersonal difficulties would predict athletes' eating psychopathology six months later, while controlling for athletes' baseline eating psychopathology. Specifically, it was expected that perceived social support from parents, coaches, and teammates would negatively predict athletes' eating psychopathology, while perceived interpersonal conflict with parents, coaches, teammates and insecure attachment styles would positively predict eating psychopathology.

7.2. Method

Participants

At stage 1 (T1) the participants were composed of 588 (242 males and 346 females) British athletes, of which 122 (36 males and 86 females) athletes with a mean age of 21.22 years ($SD= 4.02$, range =17-36) participated in the six month follow up at stage 2 (T2). Therefore the longitudinal sample (T2) consisted of 20.75% of the T1 participants. Mann Whitney tests revealed no significant differences in T1 scores of all the study variables under examination between those who only participated at T1 and those that participated in the study at T1 and T2 ($U \geq 25334.500$, $Z \leq 1.86$, $p > .05$ in all cases). However, there was a significant difference in the BMI between the athletes that only participated at T1 and the athletes that participated at T1 and T2 ($U =24261.500$, $Z = 2.46$, $p=.01$). Specifically, athletes that only participated in T1 self-reported a higher BMI ($M= 22.87$, $SD=3.11$), than athletes that had participated at T1 and T2 ($M= 22.13$, $SD=2.99$).

Ninety percent of the athletes that took part at T2 were British White, 4.9% were British Black, 2.5% were British Asian, 0.80% was British Mixed-race and 1.6% specified

British Other. Thirty-nine percent were elite athletes competing at the international or national standard, while the remaining 61% competed either for county/regional (18%), club (21%), or university teams (22%). Athletes represented a range of sports, with 62% of athletes participating in individual sports (e.g., athletics, swimming, cycling, judo, modern pentathlon), while the remaining 38% of athletes competed in team sports (e.g., rugby, football, handball, hockey). At stage 1, T2 athletes reported competing in their respective sport for 7.73 years ($SD=4.99$) and trained on average 9.08 hours ($SD=5.68$) per week. Athletes had been training with their coach for 2.68 years ($SD=3.08$), and trained on average 5.91 ($SD=4.51$) hours per week with them. Eighty-four percent of athletes identified their coach as male, while the remaining 16% identified their coach as female. Athletes had been training with their teammate for 2.47 years ($SD=2.80$) and trained an average of 6.94 ($SD=8.49$) hours per week with them. Sixty-four percent of the athletes identified their teammate as female, whereas the remaining 36% identified their teammate as male. Sixty-two percent of athletes identified their mother as the most influential parent on their athletic career, while the remaining athletes chose their father.

Materials

The following section provides a brief overview of the measures used in this study; the reader is referred to Chapter 2 of this thesis for a more detailed outline of these measures.

Demographic questionnaire. This questionnaire assessed the athletes' age, gender, ethnicity, as well as the nature and extent of their athletic involvement.

Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 2008). For the purpose of the current study, only the global EDEQ score was used. The Cronbach's alpha scores were high across T1 and T2 recording values of 0.96 (T1) and 0.95 (T2).

Sport-Specific Quality of Relationship Inventory (S-SQRI; Jowett, 2009). Only the subscales of social support and interpersonal conflict were used for the purpose of this study. The internal consistency reliability scores for athletes' perceptions of relationship with their chosen parent across the two time-points were as follows: social support (S-SQRI-PS) $\alpha = 0.84$ (T1) and 0.82 (T2); interpersonal conflict (S-SQRI-PC) $\alpha = 0.88$ (T1) and 0.85 (T2). The internal consistency scores for athletes' perceptions of relationship with their coach across the two time-points were as follows: social support (S-SQRI-CS) $\alpha = 0.87$ (T1) and

0.86 (T2); interpersonal conflict (S-SQRI-CC) $\alpha = 0.92$ (T1) and 0.86 (T2). Finally, the internal consistency scores for athletes' perceptions of relationship with their teammate across the two time-points were as follows: social support (S-SQRI-TS) $\alpha = 0.89$ (T1) and 0.86 (T2), interpersonal conflict (S-SQRI-TC) $\alpha = 0.87$ (T1) and 0.85 (T2).

Experiences in Close Relationships (ECR; Brennan et al., 1998). The ECR was employed to measure the athletes' attachment styles, and, for the purpose of this study, athletes were asked to consider how they generally feel in relation to their relationship with coaches, parents, and teammates. The Cronbach's alpha scores for avoidant attachment (ECR-AV) across the two time-points recorded values of 0.92 (T1) and 0.93 (T2) and for anxious attachment (ECR-ANX) recorded values of 0.91 (T1) and 0.92 (T2).

Procedure

Following ethical approval, data were collected via contacts made with NGBs, sport organisations (e.g., sport clubs), and universities at T1. The data were collected either electronically (via email or a secure webpage), via physical distribution prior to a specific training session (and returned in a sealed envelope the following week), or during University lectures. At T2, data collection was conducted electronically. Specifically, at T1 all athletes were asked to supply their email addresses, to which email invitations were sent at T2 to complete the aforementioned questionnaires online through a secure webpage.

Data Analysis

Kolmogorov-Smirnov tests indicated that the data were not normally distributed, thus non-parametric tests were used wherever possible. In instances where parametric tests have been employed, the results should be interpreted with caution. Initially, two-tailed Wilcoxon tests were used to compute any significant changes in athletes' BMI, global EDEQ score, S-SQRI, and ECR scores over the six month period. Next, one-tailed partial correlations were conducted, between baseline situational and dispositional interpersonal difficulties (S-SQRI, ECR subscales) and T2 global EDEQ score, while controlling for the effect of baseline global EDEQ score. Finally, to determine predictors of eating psychopathology, a Hierarchical Multiple Regression analysis was conducted in which baseline situational and dispositional interpersonal difficulties variables were entered as independent variables predicting athletes' T2 global EDEQ score, while controlling for the effect of athletes' baseline global EDEQ

score. This allowed the examination of the variance in the athletes' eating psychopathology independently explained by the interpersonal difficulties variables beyond the effect of their baseline eating psychopathology score.

7.3. Results

Descriptive Statistics

Table 7.1. Changes in eating psychopathology and interpersonal difficulties variables between baseline and T2 amongst athletes.

	T1		T2		Wilcoxon Test	
	M	SD	M	SD	Z	P
BMI	22.13	2.99	22.06	2.86	0.90	NS
ECR-AV	3.28	1.02	3.36	1.10	0.83	NS
ECR-ANX	3.54	1.03	3.62	1.10	0.61	NS
S-SQI-PS	3.07	0.68	3.15	0.64	0.68	NS
S-SQRI-PC	1.74	0.60	1.70	0.52	0.46	NS
S-SQRI-CS	2.44	0.76	2.31	0.75	1.39	NS
S-SQRI-CC	1.58	0.66	1.60	0.61	0.74	NS
S-SQRI-TS	3.10	0.71	2.92	0.80	2.00	.045
S-SQRI-TC	1.39	0.48	1.54	0.61	2.33	.02
EDEQ	1.16	1.28	1.15	1.19	1.15	NS

Note: NS= non-significant, two-tailed. ECR-AV= avoidant attachment, ECR-ANX= anxious attachment, S-SQRI-PS= parental support, S-SQRI-PC= parental conflict, S-SQRI-CS= coach support, S-SQRI-CC= coach conflict, S-SQRI-TS= teammate support, S-SQRI-TC= teammate conflict, EDEQ=global EDEQ score.

All the results presented are for the longitudinal sample (n=122). The Wilcoxon test detected significant differences on athletes' perception of conflict experienced with ($Z=2.33$, $p<.05$) and support received from ($Z=2.00$, $p<.05$) their teammate over the six month period. Specifically, athletes reported higher levels of teammate conflict and lower levels of support at T2 ($M_{\text{teammateconflict}}= 1.54$, $SD_{\text{teammateconflict}}=0.61$; $M_{\text{teammatesupport}}= 2.92$, $SD_{\text{teammatesupport}}=0.80$) than at T1 ($M_{\text{teammateconflict}}=1.39$, $SD_{\text{teammateconflict}}=0.48$; $M_{\text{teammatesupport}}= 3.10$, $SD_{\text{teammatesupport}}=0.71$). No further significant changes were detected on BMI, ECR scores, S-SQRI scores and global EDEQ score over the course of the study (see Table 7.1).

Partial Correlations between Situational and Dispositional Interpersonal Difficulties and Athletes' Eating Psychopathology

Baseline S-SQRI-Parent Support, S-SQRI-Parent Conflict, S-SQRI-Coach Support, S-SQRI-Coach Conflict, S-SQRI-Teammate Support, S-SQRI-Teammate Conflict, ECR-Avoidant Attachment, and ECR-Anxious Attachment scores were partially correlated with T2 global EDEQ score, while taking into account the effect of baseline global EDEQ score (see Table 7.2; includes Ms and SDs). As shown by Table 7.2, only S-SQRI-Coach Support, S-SQRI-Coach Conflict, S-SQRI-Teammate Support, and S-SQRI-Teammate Conflict were correlated with T2 global EDEQ score, while controlling for T1 global EDEQ score. In particular, S-SQRI-Coach Support and S-SQRI-Teammate Support were negatively related to athlete's global EDEQ score, while S-SQRI-Coach Conflict and S-SQRI-Teammate Conflict were positively correlated to athletes' global EDEQ score. As a result S-SQRI-Parent Support, S-SQRI-Parent Conflict, ECR-Avoidant Attachment, and ECR-Anxious Attachment were eliminated from subsequent analyses.

Table 7.2. Means, SDs, and partial correlations between T1 interpersonal difficulties and T2 eating psychopathology, controlling for T1 eating psychopathology.

Variables at T1	T2			
	EDEQ			
	M	SD	1.15	1.19
ECR-AV	3.28	1.02		0.04
ECR-ANX	3.54	1.03		0.04
S-SQI-PS	3.07	0.68		-0.09
S-SQRI-PC	1.74	0.60		0.02
S-SQRI-CS	2.44	0.76		-0.17*
S-SQRI-CC	1.58	0.66		0.27**
S-SQRI-TS	3.10	0.71		-0.17*
S-SQRI-TC	1.39	0.48		0.19*

Note: * $p < .05$, ** $p < .01$, one-tailed. ECR-AV= avoidant attachment, ECR-ANX= anxious attachment, S-SQRI-PS= parental support, S-SQRI-PC= parental conflict, S-SQRI-CS= coach support, S-SQRI-CC= coach conflict, S-SQRI-TS= teammate support, S-SQRI-TC= teammate conflict, EDEQ=global EDEQ score.

Table 7.3. Hierarchical Multiple Regression analyses with T1 interpersonal difficulties predicting athletes' T2 eating psychopathology

Step (df)	F	R ²	ΔR ²	B	SEB	β
Step 1 (1,120)						
T1 EDEQ	12.97	.10		0.29***	0.08	.31***
Step 2 (5, 116)						
T1 EDEQ			.09***	0.24**	0.08	.25**
S-SQRI-CS				-0.08	0.15	-.05
S-SQRI-CC				0.37*	0.16	.21*
S-SQRI-TS				-0.17	0.16	-.10
S-SQRI-TC				0.19	0.23	.08

Note: *p < .05, ** p <.01, ***p < .001. S-SQRI-CS= coach support, S-SQRI-CC= coach conflict, S-SQRI-TS= teammate support, S-SQRI-TC= teammate conflict,

EDEQ=global EDEQ score.

The Predictive Role of the Coach-Athlete and Teammate-Athlete Relationship on Athletes' Eating Psychopathology

Athletes' baseline global EDEQ score was entered at Step 1 of the Hierarchical Multiple Regression, $F(1, 120) = 12.97, p < .001$, explaining 10% of the variance in athletes' global EDEQ score at T2. After the entry of athletes' baseline global EDEQ score, S-SQRI-Coach Support, S-SQRI-Coach Conflict, S-SQRI-Teammate Support, and S-SQRI-Teammate Conflict were entered at Step 2. Doing so produced a significant model, where the total variance explained by the model as a whole increased to 19% $F(5, 116) = 5.33, p < .001$ (see Table 7.3); indicating that the quality of the coach-athlete and teammate-athlete relationship explained an additional 9% of the variance in athletes' eating psychopathology score. However, only one of the interpersonal difficulties variables was found to exert significant independent predicting power on athletes' global EDEQ score; S-SQRI-Coach Conflict ($\beta = .21, p < .05$) which independently explained 4% of the variance.

In summary, the partial correlations revealed that situational interpersonal difficulties as reflected in the quality of the coach-athlete and teammate-athlete was related to athletes' eating psychopathology after controlling for baseline eating psychopathology. However, conflict with the coach was found to be the only significant independent predictor of athletes' eating psychopathology. The quality of the relationship with parents and dispositional interpersonal difficulties were not found to be related to athletes' eating psychopathology six months later.

7.4. Discussion

In an attempt to gain a more comprehensive understanding of the connection between interpersonal difficulties and eating psychopathology, the main purpose of the current study was to determine the predictive role of both situational and dispositional interpersonal difficulties as defined by relationship quality with significant others and attachment styles in athletes' eating psychopathology over a six month period. Consolidating previous correlational empirical studies (see McIntosh et al., 2000 for a review), and in line with the study prediction, partial correlational analysis suggests that only situational interpersonal difficulties as captured by athletes' perceptions of their relationship with their coach and teammate were associated with their eating psychopathology, over and beyond their baseline eating psychopathology. Specifically, perceived provisions of support from coaches and

teammates were negatively associated with eating psychopathology, while conversely interpersonal conflict and expressions of anger and uncertainty that often accompany and underlie conflict with coaches and teammates were positively associated to athletes' eating psychopathology. These results suggest that while coach-athlete and teammate-athlete relationships perceived as supportive, warm, compassionate, caring, and free of conflict and ill-feelings can positively influence eating psychopathology, coach-athlete and teammate-athlete relationships characterised as unhelpful, unsupportive, uncooperative, interpersonal conflict, arguments, feelings of tension, anger, and distress negatively influences athletes' eating psychopathology.

Interestingly, results of the partial correlations also showed that dispositional interpersonal difficulties rooted in ones' attachment style and situational interpersonal difficulties captured by relationship quality with parents, were unrelated to athletes' eating psychopathology, while accounting for athletes' baseline eating psychopathology scores. This is not only inconsistent with the transdiagnostic cognitive behavioural theory of Fairburn et al. (2003), which suggests that a range of interpersonal difficulties are related to the onset and maintenance of eating disorders, but also many of the previous cross-sectional studies within both the general and athletic population which have reported significant associations between eating disorders and insecure attachment styles (see Chapter 5; Broberg et al., 2001; Eggert et al., 2007), as well as between eating disorders and poor quality parental relationships, (see Chapter 4, McIntosh et al., 2000; Scoffier et al., 2010). Rather, the current findings suggest that within the athletic community, athletes' attachment style which is formed through early experiences with the attachment figure (often the mother) and relationship dynamics with parents are not risk factors of athletes' eating psychopathology.

These unexpected findings can be explained in the context of sport. For instance, parents have been identified to play a significant role in the initial stages of the athletes' athletic career, such as introducing the child to the sport which is said to occur during the ages of 6 and 13 (Côté, 1999; Wylleman & Lavallee, 2004). As athletes move into more specialised sport participation, coaches are said to become the major source of influence, while parents move more into the background. Thus, given the mean age of the current sample of athletes (21.22), and the length of time they have been engaged in their chosen sport (7.33 years), it is possible that the influence of parents has been overshadowed by the sway and effect of athletes' coaches and teammates. However, given that a large number of

cross-sectional studies and the previous studies presented within this thesis have documented a link between poor quality parental relationships and eating psychopathology, the involvement of the parental relationship in athletes' eating psychopathology should not be completely excluded. It can be speculated that rather than dysfunctional parental relations being an antecedent of eating disorders, the parent-athlete relationship may become dysfunctional as a consequence of the disorder. In other words, athletes' relationship with their parents may become more problematic as a result of athletes engaging in unhealthy behaviours. For example, parents may try and help the athlete with an eating disorder (i.e., encourage them to eat more, engage in less exercise), which the athlete may not want to (as they do not think they have a problem with their eating). This can create not only feelings of tension and conflict within the parental relationship, but also a perception of lack of support from the parents to the athlete. Furthermore, several theorists have noted that eating disorders arise from a lack of encouragement of self-expression and autonomy within the familial structure (Bruch, 1973), as well as the inability to separate oneself from the family and create an individualised identity (Humphrey, 1988). However, within the athletic setting this reasoning may not be applicable, since being involved in sport allows an individual to create an identity for themselves away from their familial identity, as well as developing independence and autonomy from the family. Thus, for that reason, it is possible that attachment styles did not predict athletes' eating psychopathology. However, these speculations warrant further research.

The findings of the Hierarchical Multiple Regressions further indicated that the quality of the teammate-athlete relationship both in terms of support and conflict, and perceived levels of support from the coach had negligible predictive ability on athletes' eating psychopathology. Specifically, only coach-conflict was found as a risk factor of athletes' eating psychopathology. Interpersonal conflict is considered to reflect a state of imbalance, incongruence, and incompatibility between relationship members (Hinde, 1997) and is rarely said to be constructive organisationally, relationally, or personally (Slack, 1997). This is reflected in the current study findings, as it seems that for athletes, high levels of conflict, tension, and arguments within the coach-athlete relationship increase the risk of developing eating disorders. Although the finding of coach-conflict as the only risk factor for eating disorders was unexpected, it is not surprising in the context of the sporting environment. For instance, Fairburn et al. (2003) proposed that when tensions and conflicts exist within the family, the individual's resistance to eating is likely to be intensified.

Specifically, resistance to eating reflects a short-term intensification of the individual's need for a sense of "control," (Fairburn, Shafran et al., 1999). Accordingly, within the sport environment, the most significant relationship in athletes' lives is their relationship with their coach (Burke, 2001), with the athlete relying on their coach for both professional and personal development. Moreover, coaches are considered to fulfil the role of a parent in an athlete's life (Gervis & Dunn, 2004). Teammates, on the other hand, are in the same position as the athlete with whom they practice with, compete with or against, they are of equivalent social standing and power, they provide each-other with a sense of belonging and offer interpersonal relationship experiences that are based on intimacy and validation of self-worth (Riley & Smith, 2011). Therefore, given the prominent role that the coach plays in athletes' lives (e.g., in terms of athletic and personal development), athletes may engage in unhealthy eating behaviours in an attempt to cope with the conflict experienced in the relationship, as well as to gain an immediate sense of 'control', which is perceived to be lacking in their interactions with their coach.

The significant positive prediction of coach-conflict replicates the previous cross-sectional investigations in sport, which also found coach-conflict to be associated to athletes' eating psychopathology (see Study 2; Jones et al., 2005). The results also extends the current literature, which has found conflict with the coach to be related to negative outcomes such as poor performances (e.g., Gould, Guinan, Greenleaf, Medbery, & Peterson, 1999; Greenleaf, Gould, & Dieffenbach, 2001) and the termination of the coach-athlete partnership (Jowett, 2003). Specifically, Greenleaf et al. reported that athletes who met or exceeded their performance expectations in the 1996 summer Olympics reported the positive impact of coach contact, trust, and friendship, while athletes who failed to meet expectations cited the negative impact of coach conflict, power conflicts, and coach-athlete conflict over training on their performance. Likewise, Jowett reported that feelings of un-attachment, distress, frustration, and anger, prevented an athlete from relating to her coach, engaging and completing training sessions, and eventually the breakdown of their once successful coach-athlete relationship. Essentially, the ultimate goal of a coach-athlete relationship is to produce a combination of improved performance and optimal wellbeing in athletes. However, conflict is likely to be an inevitable part of the coach-athlete relationship, given the progressive and regressive spirals underlying relationship development during this process (Wilmot, 1975). Yet, research in this area is sparse. Given the negative consequences that the presence of conflict in the coach-athlete relationship can have highlighted by the current

study, as well as those by Gould and colleagues and Jowett, the nature and antecedents of coach-conflict are areas that need to be addressed. For instance, interpersonal conflict is said to be composed of two dimensions; content (i.e., task, issue driven) and relational (i.e., affective, emotional) (see Lavoie, 2007). Thus, it would seem critical to identify the source (i.e., stressor) of the coach-conflict, as this can then facilitate the development of strategies and interventions to help minimise conflict in the relationship.

The finding of coach-conflict as a risk factor for athletes' eating psychopathology holds significant theoretical implications, as well as implications for practice. Specifically, Schmidt and Treasure (2006) noted that Fairburn et al. (2003) provided very little detail as to which aspects of interpersonal difficulties are important in eating disorders in their transdiagnostic cognitive behavioural theory. Consequently, the current findings suggest that situational interpersonal difficulties (i.e., relationship quality with coaches and teammates) may be of more relevance in the development of eating disorders than dispositional interpersonal difficulties, such as attachment styles. However, as this is the first study to examine the prospective role of both situational and dispositional interpersonal difficulties, further research is warranted in this area to support this assumption. From a practical sense, NGBs, athletic clubs, sport organisations, and universities need to recognise the essential role of interpersonal relationships, in particular the coach-athlete relationship (and to a lesser extent the teammate-athlete relationship) in athletes' eating psychopathology. Specifically, they need to be aware that athletes' preoccupation about their weight, shape, and eating could be concealing underlying interpersonal problems that they may be encountering with their fellow coaches (and teammates). Secondly, coaches (and teammates) need to be attuned to how their behaviours and actions may facilitate the onset of unhealthy eating behaviours amongst their fellow athletes. Moreover, with interpersonal problems linked to the maintenance of the disorder (Fairburn et al., 2003) as well as poor treatment response (Hartmann et al., 2010), appropriate training and educational workshops need to be put in place, which aim to productively address any problems that may exist, as well as helping coaches, athletes, and teammates manage their relationships better, and teaching athletes to eat when they are hungry and not in response to any underlying interpersonal problems that may exist.

Despite the present study's conscious effort to build upon the limitations of previous literature (e.g., longitudinal design, controlling for initial eating psychopathology scores), the

present results should be interpreted within the context of the following limitations. First, although the present findings are consistent with a causal interpretation, they are essentially correlational, thus preventing definitive conclusions about causality. Therefore, future studies should aim to replicate and confirm the present findings using experimental designs as this is considered the next step in identifying true causal risk factors (Jacobi, Hayward et al., 2004). Another limitation of the present study is the high rate of attrition. Although no significant differences were detected on the study variables, between those that responded at T2 and those that did not, the small response rate raises questions about the generalisability of the current findings. Finally, the present study only examined the direct role of interpersonal relationships in athletes' eating psychopathology. Fairburn et al. (2003) noted in their transdiagnostic theory that interpersonal difficulties interact with other core psychopathological processes (low self-esteem, clinical perfectionism, and mood intolerance) to potentially elicit and maintain eating disorders. Moreover, findings from the previous chapters of this thesis reinforce the multiple pathways between interpersonal difficulties and eating psychopathology. This could explain the relatively low variance explained by situational interpersonal difficulties in athletes' eating psychopathology, and as such future studies should seek to examine how such processes (e.g., clinical perfectionism, self-esteem, and mood-intolerance) interact with interpersonal difficulties to elicit eating psychopathology using a longitudinal design.

7.5. Conclusion

In summary, the findings of the present study have demonstrated the risk status of both situational and dispositional interpersonal difficulties in athletes' eating psychopathology, which has been previously unexplored employing a longitudinal design. Specifically, the findings indicate that conflict with the coach is a risk factor for eating disorders in athletes. Thus, coaches and athletes need to ensure that they do not shy away or avoid issues of conflict in their relationships, given the negative consequences that can arise as a result.

STUDY 5

Application of the Transdiagnostic Cognitive Behavioural Model of Eating Disorders to an Athletic Population

Fairburn et al.'s (2003) transdiagnostic cognitive-behavioural theory of eating disorders provides a grounded conceptual framework to understand the onset and maintenance of eating disorders amongst the general population. While, there appears to be a large amount of evidence to support the highlighted processes of the theory and the associations among its main components within the general population, there is an observable gap in the scientific understanding of such processes within the athletic population, as well as paucity in the understanding of the concomitant interrelationships among the processes involved. Therefore, the focus of this chapter of the thesis was to test the underlying constructs of Fairburn et al.'s theory in a sample of athletes to further understand eating psychopathology. In addition to assessing the relationships between the main components, the current chapter also examined the extent to which the final tested model can be applied across gender, sport type, and performance standard to explain eating psychopathology amongst athletes⁴.

⁴ The study arising from this chapter has been published as Shanmugam, V., Jowett, S., & Meyer, C. (2011). Application of the transdiagnostic cognitive-behavioural model of eating disorders to the athletic population. *Journal of Clinical Sport Psychology*, 5(2), 166-191.

8

Application of the Transdiagnostic Cognitive Behavioural Model of Eating Disorders to an Athletic Population

Abstract

Objective: The purpose of this study was twofold: to explore the applicability of the components related to the transdiagnostic cognitive-behavioural theory of eating disorders within an athletic population, and to investigate the extent to which this framework can be applied across gender, sport type, and performance standard to explain eating psychopathology. **Method:** Five hundred and eighty-eight ($N = 588$) male and female British athletes completed a battery of self-report instruments related to eating psychopathology, interpersonal difficulties, perfectionism, self-esteem, and depression. **Results:** Structural equation modelling revealed that elevated eating psychopathology may arise from an interaction of interpersonal difficulties, low self-esteem, high levels of self-critical perfectionism, and depressive symptoms. Analysis further highlighted that the manner in which elevated eating psychopathology may arise is invariant across athletes' sport type and performance standard, but not across gender. **Conclusion:** The current findings suggest that the tested components of the transdiagnostic cognitive-behavioural theory are pertinent and useful in explaining eating psychopathology among athletes.

8.1. Application of the Transdiagnostic Cognitive-Behavioural Model of Eating Disorders to an Athletic Population

Eating disorders are a chronic and debilitating disease, with fatal consequences. Athletes with eating disorders not only risk compromising their performance, but also their health and general wellbeing (e.g., Currie & Morse, 2005). Thus, the identification of the potential risk factors which are likely to contribute to the onset of eating disorders presents a valuable avenue for research. Although the development of eating disorders is multifaceted including biological, developmental, environmental, psychological, and familial components (Pike et al., 2008), the focus and scope of the research examining eating disorders in athletes has been limited. Specifically, much of the research has primarily examined sport-specific

risk factors including physical injury and sport related pressures (e.g., Greenleaf, 2004; Smiley et al., 2008; Sundgot-Borgen, 1994). In this regard, Petrie and Greenleaf (2007) suggested the need to examine more generic and context-free psychosocial factors in order to fully understand the aetiology of disordered eating among athletes.

Fairburn et al. (2003) introduced the transdiagnostic cognitive-behavioural theory of eating disorders, which was based on clinical observations that all three types of eating disorders (AN, BN, and EDNOS) share many distinctive features, and that patients with eating disorders frequently migrate from one disorder to another. Fairburn and colleagues proposed that AN, BN, and EDNOS are underpinned by the same core psychopathological processes. Specifically, they proposed that the four psychopathological processes of clinical perfectionism, unconditional and pervasive low self-esteem, mood intolerance, and interpersonal difficulties all interrelate with the core psychopathology of eating disorders, termed over-evaluation of eating, shape, weight, and their control, to instigate both the development and the maintenance of the disorder.

While Fairburn et al.'s (2003) transdiagnostic cognitive-behavioural theory of eating disorders provides a grounded conceptual framework to understand how eating disorders may arise with relevant evidence to support the associations among its main components within the general population, there is an observable gap in the scientific understanding of such processes within the athletic population, as well as paucity in the understanding of the concomitant interrelationships among the processes involved. Thus, the purpose of the present study was to test the main components of Fairburn et al.'s transdiagnostic theory in a sample of athletes to further understand eating psychopathology. Guided by Fairburn et al.'s (2003) theory and relevant empirical research (e.g., Collins & Read, 1990; Dunkley et al., 2003; Dunkley & Grilo, 2007; Leveridge et al., 2005; Stirling & Kerr, 2006) the first objective was to test a model that proposed linkages between interpersonal difficulties, the psychopathological processes of clinical perfectionism, self-esteem, depression, and eating psychopathology (see Figure 1.2). Specifically, it was hypothesised that dispositional interpersonal difficulties as reflected in athletes' insecure attachment styles would negatively affect their perceptions of situational interpersonal difficulties as reflected in athletes' relationship quality with parents and coaches (e.g., decreased perceived support and increased perceived conflict). It was further hypothesised that poor relationship quality would lead to

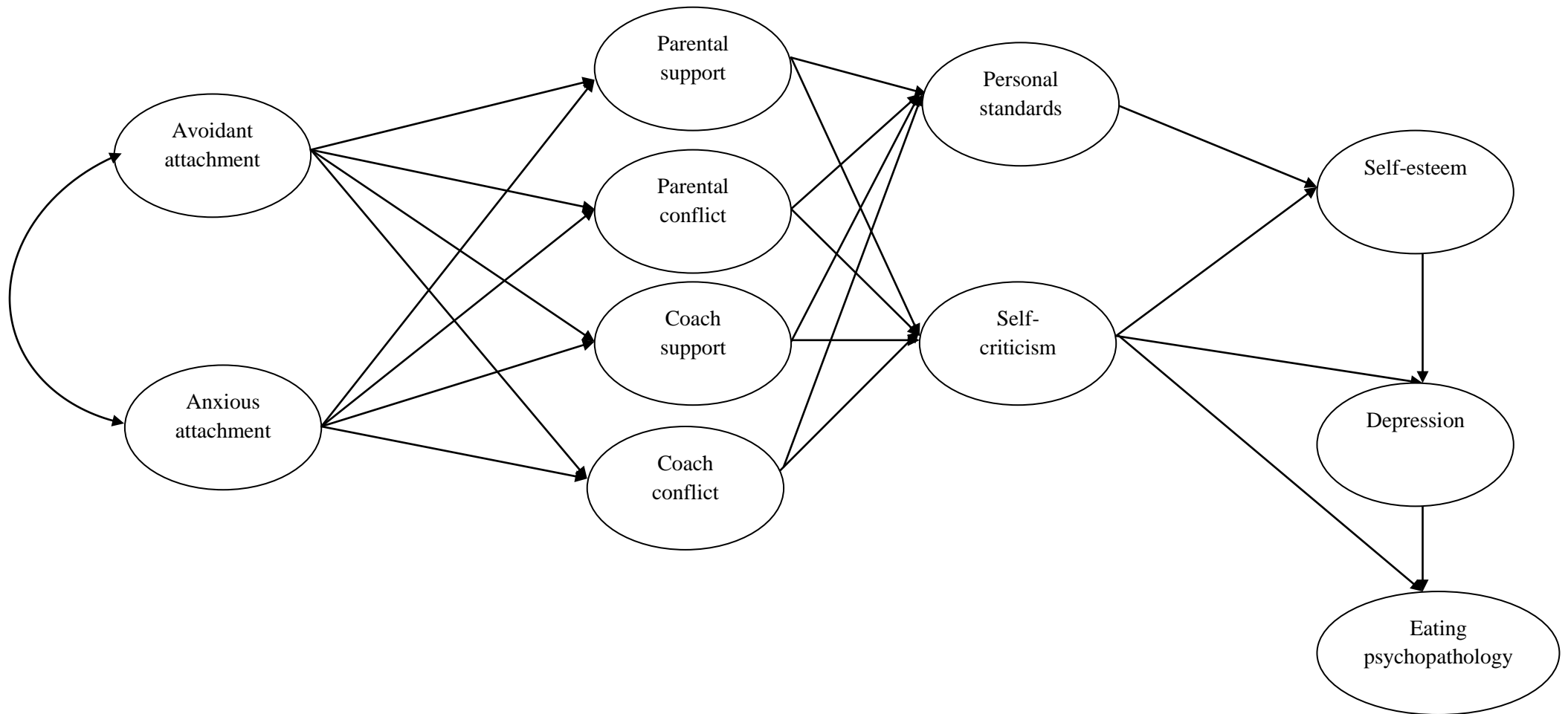


Figure 1.2. The hypothesised transdiagnostic cognitive-behavioural model of athletes' eating psychopathology.

higher levels of clinical perfectionism (personal standards and self-criticism). Subsequently, athletes' levels of personal-standards perfectionism was expected to negatively predict their levels of self-esteem, while athletes' levels of self-critical perfectionism were predicted to negatively estimate their levels of self-esteem, but to positively predict depressive symptoms and eating psychopathology. Finally, it was hypothesised that athletes' levels of self-esteem would negatively predict their levels of depressive symptoms, which in turn were expected to be positively associated with athletes' eating psychopathology.

In addition, given the lack of literature within the sporting domain exploring whether the risk factors of eating psychopathology vary between specific populations, the second objective of the study was to investigate the potential impact of athletes' gender, sport type, and performance standard on the applicability of the hypothesised model in explaining eating psychopathology. As Fairburn (2008a) proposed that the psychopathological processes involved in the transdiagnostic theory are essentially universal, it was predicted that the hypothesised model tested and the pattern of proposed associations would be invariant/equal across gender, sport type, and performance standard.

8.2 Method

Participant Characteristics

Recruited as part of a larger study examining the prevalence of eating disordered psychopathology amongst athletes, the current sample consisted of 588 (242 males and 346 females) British athletes with a mean age of 20.75 ($SD = 3.44$) years and a BMI of 22.72 ($SD=3.10$). Eighty-eight percent of the athletes were British White, 4.4% were British Black, 3.4% were British Asian, 2.9% were British Mixed-race and 1% responded British-Other. Thirty-one percent were elite athletes competing at the international or national standard, while the remaining 69% were non-elite athletes, competing for county/regional (20%), club (19%), or university teams (30%). Fifty-three percent of athletes engaged in individual sports (e.g., swimming, cycling, fencing), and the remaining 47% of athletes competed in team sports (e.g., football, hockey, rugby). Athletes had been participating in their chosen sport for an average of 8.49 years ($SD = 5.02$), and trained an average of 8.64 hours per week ($SD = 5.47$). Athletes had trained with their respective coach for an average of 2.80 years ($SD = 3.81$), of which 82% of athletes identified their coach as male and 18% identified their coach

as female. Almost 54% of athletes selected their mother as the most influential parent with respect to their athletic career, whereas the remaining 46% selected their father.

Materials

The following section provides a brief overview of the measures used in this study; the reader is referred to Chapter 2 of this thesis for a more detailed outline of these measures.

Demographic questionnaire. This questionnaire assessed the athletes' age, gender, ethnicity, as well as the nature and extent of their athletic involvement.

Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 2008). For the current study, the 22 items measuring key attitudinal features associated with eating psychopathology through the four subscales of Restraint, Eating Concern, Shape Concern, and Weight Concern were used. The Cronbach's alpha scores were high recording values between 0.76-0.91.

Sport-Specific Quality of Relationship Inventory (S-SQRI; Jowett, 2009). For the purpose of this study only the subscales of social support and interpersonal conflict were used. In the case of the parent version of the S-SQRI, participants were asked to respond to the statements in relation to the parent who has had the prominent influence in their athletic development. The internal consistency reliability for athletes' perception of their relationship with their chosen parent was high recording 0.83 for social support and 0.87 for interpersonal conflict. The internal consistency reliability for athletes' perception of their relationship with their coach was also high, recording 0.86 for social support and 0.88 for interpersonal conflict.

Experiences in Close Relationships (ECR; Brennan et al., 1998). The ECR used to measure athletes' attachment styles. The Cronbach's alpha scores for both subscales were high, recording 0.90 for avoidant attachment and 0.91 for anxious attachment.

Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990). Complying with Shafran et al.'s (2002) assertion of the 7-item FMPS personal standard as '*the closest to the clinical concept of perfectionism*' (p. 777), only this subscale was used for the purpose of this study. The internal consistency score for athletes' levels of personal standards was 0.83.

Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978). For the purpose of the current study, only the 15-item self-criticism subscale was used. The internal consistency score for athletes' levels of self-criticism was 0.92.

Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965). The RSES was used to assess athletes' general self-esteem. The internal consistency score for athletes' levels of self-esteem was above the minimal recommendation, at 0.87.

Symptom Checklist 90R (SCL-90; Derogatis, 1983). For the purpose of this study, the depression⁵ subscale of SCL-90R was used to measure the current, point-in-time psychological symptoms and manifestations associated with clinical depression. The internal consistency score for athletes' levels of depression was 0.88.

Procedure

Following ethical clearance, data were collected via contacts made with NGBs, sport organisations (e.g., sport clubs), and universities. The data were collected either electronically (via email or a secure webpage); via distribution prior to a specific training session (and returned in a sealed envelope the following week), or via distribution during University lectures.

Data Analysis

Means (*Ms*), standard deviations (*SDs*), Multivariate Analysis of Variance (MANOVAs), and Spearman Rho's correlations for all the main study variables were initially calculated⁶. To assess the applicability of the transdiagnostic model with a sample of athletes, the hypothesised model was tested via structural equation modelling (SEM) using EQS (Bentler, 1997) employing the Maximum Likelihood estimation procedure. Multiple fit indices were employed to evaluate the adequacy of the estimated model. Specifically, the significance of χ^2 , the normed chi-square, the Root Mean Square Error of Approximation (RMSEA), the Non Normed Fit Index (NNFI), the Comparative Fit Index (CFI) were all used to evaluate the fit of the model (see Chapter 2 for more details). Given the small number of participants and the large number of observed variables, on the recommendations of Yang et

⁵ The subscale is composed of 13 items, but one item related to sexual pleasure was removed from the present study as it was deemed inappropriate for the purpose of this study.

⁶ Only variables that were associated with the main study variable (i.e., eating psychopathology) were included in the model.

al. (2010), item parcelling was conducted. Following guidelines related to item parcelling, items underlying the latent variables of the study were grouped together to produce parcels.

Table 8.1: Standardised factor loadings from the measurement model

Variable	Factor loading (error)	Variable	Factor loading (error)	Variable	Factor loading (error)
ECR-AV		ECR-ANX		SCL-Depression	
Parcel 1 (3 items)	0.79 (0.62)	Parcel 1 (3 items)	0.69 (0.73)	Parcel 1 (2 items)	0.80 (0.60)
Parcel 2 (3 items)	0.70 (0.71)	Parcel 2 (3 items)	0.65 (0.76)	Parcel 2 (2 items)	0.72 (0.69)
Parcel 3 (3 items)	0.78 (0.63)	Parcel 3 (3 items)	0.70 (0.71)	Parcel 3 (2 items)	0.77 (0.64)
Parcel 4 (3 items)	0.86 (0.52)	Parcel 4 (3 items)	0.89 (0.46)	Parcel 4 (2 items)	0.86 (0.51)
Parcel 5 (3 items)	0.79 (0.61)	Parcel 5 (3 items)	0.75 (0.67)	Parcel 5 (2 items)	0.69 (0.72)
Parcel 6 (3 items)	0.82 (0.58)	Parcel 6 (3 items)	0.86 (0.51)	Parcel 6 (2 items)	0.78 (0.62)
S-SQRI-PS		S-SQRI-CS		S-SQRI-PC	
Parcel 1 (2 items)	0.83 (0.56)	Parcel 1 (2 items)	0.86 (0.50)	Parcel 1 (2 items)	0.82 (0.57)
Parcel 2 (2 items)	0.77 (0.64)	Parcel 2 (2 items)	0.75 (0.66)	Parcel 2 (2 items)	0.90 (0.45)
Parcel 3 (2 items)	0.82 (0.57)	Parcel 3 (2 items)	0.90 (0.44)	Parcel 3 (2 items)	0.77 (0.64)
S-SQRI-CC		FMPS-PS		EDEQ	
Parcel 1 (2 items)	0.78 (0.63)	Parcel 1 (2 items)	0.85 (0.54)	Parcel 1 (5 items)	0.69 (0.72)
Parcel 2 (2 items)	0.90 (0.44)	Parcel 2 (2 items)	0.65 (0.76)	Parcel 2 (5 items)	0.79 (0.62)
Parcel 3 (2 items)	0.91 (0.41)	Parcel 3 (3 items)	0.89 (0.46)	Parcel 3 (5 items)	0.95 (0.31)
RSES		DAS-SC		Parcel 4 (4 items)	0.90 (0.43)
Parcel 1 (2 items)	0.78 (0.63)	Parcel 1 (3 items)	0.80 (0.60)	Parcel 5 (4 items)	0.90 (0.44)
Parcel 2 (2 items)	0.82 (0.58)	Parcel 2 (3 items)	0.82 (0.57)		
Parcel 3 (2 items)	0.69 (0.72)	Parcel 3 (3 items)	0.88 (0.48)		
Parcel 4 (2 items)	0.79 (0.61)	Parcel 4 (3 items)	0.84 (0.54)		
Parcel 5 (2 items)	0.68 (0.74)	Parcel 5 (3 items)	0.80 (0.60)		

Note: All loadings are significant at the .05 level. ECR-AV= avoidant attachment, ECR-ANX= anxious attachment, S-SQRI-PS= parental support, S-SQRI-PC= parental conflict, S-SQRI-CS= coach support, S-SQRI-CC=coach conflict, FMPS-PS=personal standards perfectionism, DAS-SC= self-critical perfectionism, RSES=self-esteem, SCL-Depression=depression, EDEQ= eating psychopathology

This procedure helped to meet the recommended 10:1 ratio of subjects to observed variables (Kline, 2005). All factor loadings were satisfactory (see Table 8.1), and recorded above the recommended value of 0.40 (Ford et al., 1986). Once a satisfactory overall measurement and structural model meeting the aforementioned criteria was composed for the whole athletic population, the model was subjected to further tests that aimed to assess whether its estimates varied across groups (e.g., gender, sport type, and performance standard).

Prior to group invariance tests, a series of MANOVAs were conducted to detect any group differences in the study variables according to gender, sport type, and performance standard. Subsequently, to address group invariance, the steps of Byrne (2006) were followed to validate the casual structure of the final model (see Chapter 2 for more details).

8.3. Results

Descriptive Statistics

Table 8.2 presents the descriptive statistics and the correlations for the main study variables. As shown in Table 8.2, the correlations ranged from weak to high, but all correlations were in the expected direction.

Testing the Transdiagnostic Cognitive-Behavioural Model of Eating Disorders

Due to the normalised estimates of multivariate skewness and kurtosis exceeding the recommended value, corrections for nonnormality were used and therefore only the robust statistics are reported. The CFA measurement model revealed that the hypothesised model (see Figure 1.2) fit the data well: $\chi^2 = 2159.95$, $df = 1025$, $p < .0001$, RMSEA = 0.043 (90% CI = 0.041–0.046), NNFI = 0.92, and CFI = 0.93; however, the predicted structural model (Figure 1.2) failed to achieve an acceptable goodness of fit: $\chi^2 = 2645.57$, $df = 1057$, $p < .0001$, RMSEA = 0.051 (90% CI = 0.048–0.053), NNFI = 0.89, and CFI = 0.90. By dropping all the non-significant paths, pathways between DAS-Self-Critical perfectionism to SCL-Depression and eating psychopathology, parameters associated to FMPS-Personal Standards and ECR-Anxious Attachment and creating a linear pathway between S-SQRI-Parental Support, S-SQRI-Coach Support, and S-SQRI-Parental Conflict and S-SQRI-Coach Conflict, respectively, the model fit improved to ensure an acceptable goodness of fit and a parsimonious model. The overall fit of the final model was $\chi^2 = 1367.94$, $df = 693$, $p < .0001$, RMSEA = 0.041 (90% CI = 0.038–0.044), NNFI = 0.94, and CFI = 0.94 (see Figure 8.1).

Table 8.2. Ms, SDs, and Spearman Rho Correlations for ECR, Parental S-SQRI, Coach S-SQRI, DAS-self-criticism, FMPS-PS, RSES, SCL-depression, and EDEQ

Variables	Ms	SDs	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1.ECR-AV	3.26	0.93	1.0	.35**	-.20**	.13**	-.15**	.12**	.10**	.29**	-.31**	.20**	.10**	.12**	.19**	.18**
2.ECR-ANX	3.52	1.01		1.0	-.13**	.21**	-.09*	.17**	.06	.42**	-.53**	.56**	.18**	.29**	.39**	.33**
3. S-SQRI-PS	3.17	0.65			1.0	-.38**	.15**	.01	.10*	-.21**	.18**	-.09*	-.09*	-.12**	-.07**	-.10*
4. S-SQRI-PC	1.72	0.60				1.0	.02	.14**	.10**	.26**	-.23**	.23**	.13**	.11**	.21**	.18**
5. S-SQRI-CS	2.38	0.71					1.0	-.18**	.11**	-.10**	.10**	-.09*	-.05	-.05	-.13**	-.15**
6. S-SQRI-CC	1.53	0.60						1.0	.13**	.24**	-.22**	.22**	.05	.11**	.17**	.13**
7. FMPS-PS	26.57	4.57							1.0	.27**	.02	.09*	.11**	.02	.07*	.05
8. DAS-SC	43.34	15.74								1.0	-.40**	.39**	.25**	.32**	.36**	.32**
9. RSES	20.90	4.67									1.0	-.50**	-.23**	-.30**	-.42**	-.35**
10. SCL-Depression	0.90	0.67										1.0	.27**	.34**	.46**	.42**
11. Restraint	1.01	1.21											1.0	.58**	.60**	.62**
12. Eating Concern	0.49	0.83												1.0	.64**	.67**
13. Shape Concern	1.46	1.45													1.0	.84**
14. Weight Concern	1.06	1.31														1.0

Note: * $p < .05$, ** $p < .01$, one-tailed. ECR-AV= avoidant attachment, ECR-ANX= anxious attachment, S-SQRI-PS= parental support, S-SQRI-PC= parental conflict, S-SQRI-CS= coach support, S-SQRI-CC=coach conflict, FMPS-PS=personal standards perfectionism, DAS-SC= self-critical perfectionism, RSES=self-esteem, SCL-Depression=depression. Eating psychopathology is captured by Restraint, Eating Concern, Shape Concern, and Weight Concern.

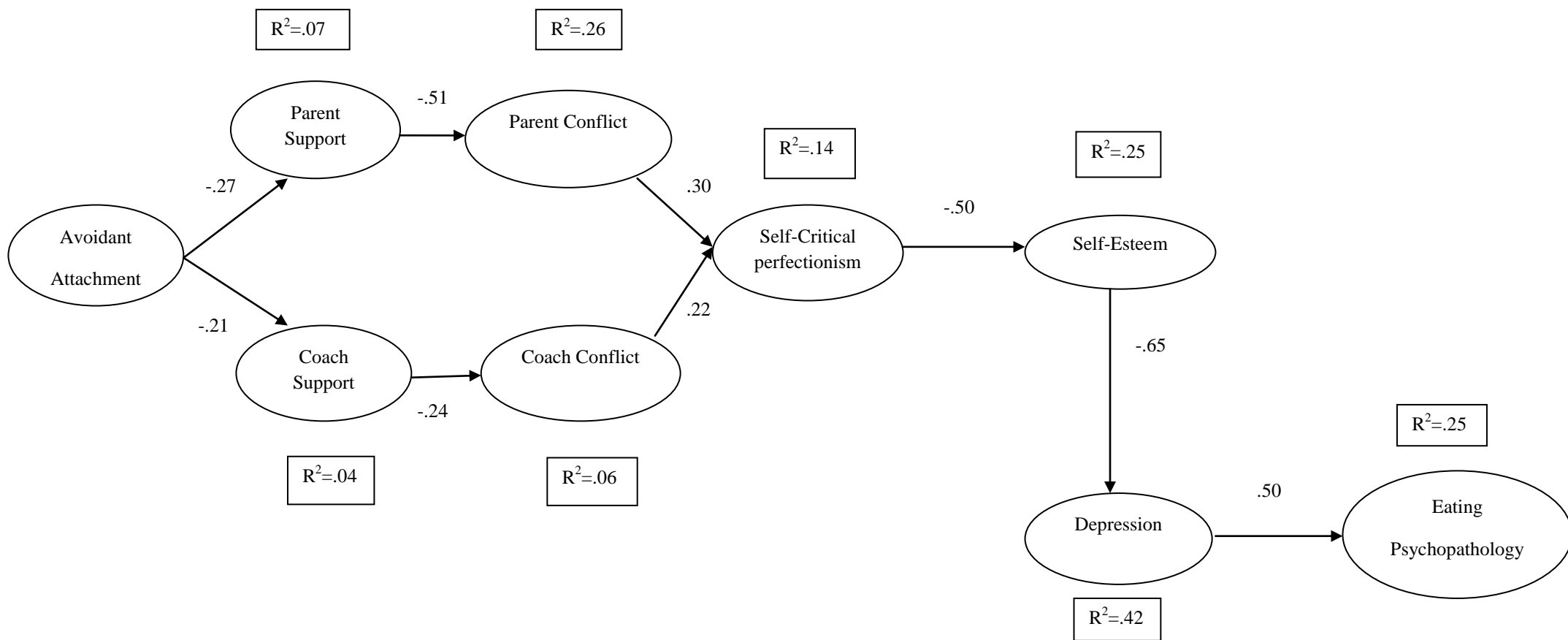


Figure 8.1. A structural representation of the transdiagnostic cognitive behavioural model of athletes' eating psychopathology. The standardised coefficients presented are significant at .05 level.

As χ^2 is considered to be highly sensitive to sample size, the normed chi-square was calculated by dividing the chi-square value by the degrees of freedom. The normed chi-square value was 1.97 (1367.94/693). Thus, the normed chi-square value and all the other incremental fit indices provide good support for the final model.

As shown in Figure 8.1, ECR-Avoidant Attachment significantly and negatively predicted athletes' perceived S-SQRI- Parental and Coach Support. Subsequently, perceived S-SQRI- Parental and Coach support negatively predicted S-SQRI- interpersonal conflict experienced with parents and coaches. Interpersonal conflict with parents and coaches positively predicted athletes' DAS- Self-Critical perfectionism. DAS- Self-Critical perfectionism then negatively predicted RSES, which in turn negatively predicted SCL-Depression. Finally, athletes' level of SCL-Depression positively predicted eating psychopathology.

Testing for Invariance across Groups

A series of MANOVAs were first performed on all the study variables to examine the differences among attachment styles, relationship quality, eating psychopathology, depression, self-esteem, and perfectionism levels according to gender, sport type, and competition level. Notable gender differences were detected⁷. In particular, analyses revealed a significant main effect of gender on attachment styles, (Pillai's Trace = 0.05, $F(2, 585) = 15.03$, $p < .001$, $\eta^2 = 0.05$); on the quality of the parent-athlete relationship (Pillai's Trace = 0.02, $F(2, 585) = 6.41$, $p < .01$, $\eta^2 = 0.02$) and on the quality of the coach-athlete relationship (Pillai's Trace = 0.01 $F(2, 585) = 3.81$, $p < .05$, $\eta^2 = 0.01$), with female athletes reporting significantly higher levels of ECR- Anxious Attachment and S-SQRI-Parental and Coach Conflict ($M_{\text{anxious}} = 3.70$, $SD_{\text{anxious}} = 1.01$; $M_{\text{parentconflict}} = 1.77$, $SD_{\text{parentconflict}} = 0.62$; $M_{\text{coachconflict}} = 1.59$, $SD_{\text{coachconflict}} = 0.63$) than male athletes ($M_{\text{anxious}} = 3.26$, $SD_{\text{anxious}} = 0.96$; $M_{\text{parentconflict}} = 1.65$, $SD_{\text{parentconflict}} = 0.58$; $M_{\text{coachconflict}} = 1.45$, $SD_{\text{coachconflict}} = 0.56$). In addition, a significant main effect of gender was detected on self-esteem and depression (Pillai's Trace = 0.07, $F(2, 585) = 21.62$ $p < .001$, $\eta^2 = 0.07$), and on perfectionism scores (Pillai's Trace = 0.03, $F(2, 585) = 9.30$, $p < .001$, $\eta^2 = .03$), with female athletes reporting lower levels of RSES, but higher levels of SCL-Depression and DAS-Self-Critical perfectionism ($M_{\text{self-esteem}} = 19.98$,

⁷ Some sport type and performance standard differences were also detected on the quality of the coach-athlete relationship and high standards perfectionism, with athletes competing in individual sports and elite athletes reporting higher levels of support from their coach than their respective counterparts. In addition elite athletes also reported higher levels of personal standard perfectionism than non-elite athletes.

$SD_{\text{self-esteem}} = 4.41$; $M_{\text{depression}} = 1.03$, $SD_{\text{depression}} = 0.70$; $M_{\text{self-criticism}} = 45.10$, $SD_{\text{self-criticism}} = 16.11$) than male athletes ($M_{\text{self-esteem}} = 22.22$, $SD_{\text{self-esteem}} = 4.72$; $M_{\text{depression}} = 0.72$, $SD_{\text{depression}} = 0.59$; $M_{\text{self-criticism}} = 40.82$, $SD_{\text{self-criticism}} = 14.84$). Finally, significant differences were detected on eating psychopathology (Pillai's Trace = 0.10, $F(4, 583) = 16.14$, $p < .001$, $\eta^2 = 0.10$), with female athletes reporting higher Restraint ($M_{\text{female}} = 1.11$, $SD_{\text{female}} = 1.30$; $M_{\text{male}} = 0.85$, $SD_{\text{male}} = 1.04$), Eating Concern ($M_{\text{female}} = 0.64$, $SD_{\text{female}} = 0.95$; $M_{\text{male}} = 0.27$, $SD_{\text{male}} = 0.55$), Weight Concern ($M_{\text{female}} = 1.35$, $SD_{\text{female}} = 1.47$; $M_{\text{male}} = 0.64$, $SD_{\text{male}} = 0.88$), and Shape Concern ($M_{\text{female}} = 1.82$, $SD_{\text{female}} = 1.55$; $M_{\text{male}} = 0.95$, $SD_{\text{male}} = 1.13$) than male athletes. Subsequently, a series of multigroup analyses were conducted to determine whether the pattern of results found in the final model (see Figure 8.1) varied across gender, sport type, and competitive level. The findings revealed well-fitting multigroup models across sport type and performance standard, suggesting that there is general equivalence of the model across these populations (see Table 8.3). In addition, results of the LM Test of equality constraints and specifically the univariate incremental χ^2 values with probability values $< .05$ revealed 3 parameters as noninvariant across sport type (2 factor loadings and the path between coach conflict to self-critical perfectionism). In the case of performance standard, univariate incremental χ^2 values with probability values $< .05$ also revealed 3 parameters as noninvariant (2 factor loadings and the path between coach support to coach conflict). However, given the rigor of the equality constraints imposed, with the exception of these parameters, it can be inferred that the causal pattern of interpersonal difficulties, self-critical perfectionism, self-esteem, depression, and eating psychopathology as shown in Figure 8.1 are equivalent across sport type and performance standard. In contrast, the model was found to differ according to gender. While the model achieved an acceptable goodness of fit for females $\chi^2 = 1097.56$, $df = 693$, $p < .0001$, RMSEA = 0.041 (90% CI = .036–.046), NNFI = 0.94, CFI = 0.95, when the same model was tested for males, it failed to achieve an acceptable goodness of fit, $\chi^2 = 1128.18$, $df = 693$, $p < .0001$, RMSEA = 0.051 (90% CI = 0.045–0.056), NNFI = 0.89, and CFI = 0.89. Thus, multigroup invariance tests for gender were not continued.

Table 8.3. Fit indices for multi-group analyses for sport type and competition level

Model	χ^2	<i>Df</i>	RMSEA	CI for RMSEA	NNFI	CFI
1. Baseline model across sport type	2240.33	1386	.046	.042-.049	.92	.93
2. Constrained factor loadings	2276.98	1416	.046	.042-.049	.92	.93
3. Constrained factor loading and variance	2279.23	1417	.046	.042-.049	.92	.93
4. Constrained factor loadings, variance and path coefficients	2292.31	1426	.046	.042-.049	.92	.93
5. Constrained path coefficients	2256.22	1395	.046	.042-.049	.92	.93
1. Baseline model across competitive level	2135.16	1386	.043	.039-.046	.93	.94
2. Constrained factor loadings	2164.16	1416	.042	.039-.046	.93	.94
3. Constrained factor loading and variance	2163.22	1417	.042	.039-.046	.93	.94
4. Constrained factor loadings, variance and path coefficients	2176.10	1426	.042	.039-.046	.94	.94
5. Constrained path coefficients	2145.06	1395	.043	.039-.046	.93	.94

Note: χ^2 = chi Square, RMSEA = Root Mean Square Error of Approximation, CI for RMSEA = 90% confidence interval of Root Mean Square Error of Approximation, NNFI = Non Normed Fit Index, CFI = Comparative Fit Index.

8.4. Discussion

In an attempt to bridge the observable gap in the understanding of potential risk factors associated with eating disorders among athletes, the main aim of the current study was to explore the applicability of constructs related to the transdiagnostic cognitive-behavioural theory of eating disorders within this population. Guided by Fairburn et al.'s (2003) theory and relevant research, the first objective was to determine whether the psychopathological processes hypothesised to be involved in the maintenance of eating disorders within the general population would be applicable in explaining core eating psychopathology indicative of clinical eating disorders among a sample of athletes. Overall, the findings suggest that the hypothesised processes of interpersonal difficulties, clinical perfectionism (self-critical), self-esteem, and depression are applicable and can be used to help explain problematic eating in athletes.

Specifically, it was found that avoidant attachment was associated with poor quality relationships (that are characterised by decreased perceived support and increased perceived

conflict) with their influential parent and principal coach. Moreover, athletes who experienced more conflict in their relationships were more likely to criticise themselves, which in turn can possibly result in low self-esteem with athletes feeling unvalued and worthless as individuals. Subsequently, low self-esteem was linked to higher depressive symptoms, which in turn was linked to elevated eating psychopathology. Conversely, the findings also suggested that the same processes that are likely to lead to elevated eating psychopathology are also likely to prevent it. In particular, secure attachment was associated with high quality parental and coach-athlete relationships, resulting in low levels of self-criticism, which in turn was associated with higher levels of self-esteem. Subsequently, high levels of self-esteem were associated with low levels of depression, which in turn was linked to healthy eating. Collectively, these findings are consistent with the assumptions of the transdiagnostic cognitive-behavioural theory and with previous findings that have linked avoidant attachment (e.g., Chassler, 1997; Cole-Detke & Kobak, 1996; Ramacciotti et al., 2001), poor quality relationships (e.g., McIntosh et al., 2000), low levels of self-esteem (e.g., Shea & Pritchard, 2007), high levels of self-critical perfectionism (e.g., Dunkley, Blankstein et al., 2006), and depression (e.g., Stice & Bearman, 2001) to disturbed eating behaviours.

From a theoretical point of view, the results of this study offer several channels for the advancement of the transdiagnostic framework. First, while Fairburn and colleagues (2003) emphasised the importance of different aspects of interpersonal difficulties, they did not mention the potential synergistic effects of the different aspects of interpersonal difficulties in the onset and maintenance of the disorder. The findings of this study allude to the synergy that may exist between dispositional interpersonal difficulties (or lack thereof) as captured in this study via athletes' attachment style and situational interpersonal difficulties as captured in this study via the quality of close relationships athletes develop with their coaches and their parents. Moreover, this is consistent with the broader literature on adult attachment (e.g., Campbell et al., 2005; Collins & Read, 1990; Leveridge et al., 2005; Mikulincer & Shaver, 2007) and sport psychology literature (e.g., Carr, 2009; Davis & Jowett, 2010). Consequently, the model tested suggests that interpersonal difficulties may be better viewed as an interaction of a complex system of relationship issues encapsulated in both state-like (relationship dynamics) and trait-like (attachment styles) characteristics. This is in line with the recent findings of Bodell, Smith, Holm-Denoma, Gordon, and Joiner (2011), who also reported a synergistic interplay between relationship quality and adverse life events in

bulimic symptoms. However, further research is warranted in this area to support this conceptualisation.

Second, in terms of clinical perfectionism, the current findings indicate that self-critical perfectionism may play a more pivotal role in eating psychopathology than personal standard perfectionism. In particular, the current results highlighted self-critical perfectionism as a stronger correlate of interpersonal difficulties (attachment styles and relationship quality), self-esteem, depression, and eating psychopathology than personal standards. When the initial hypothesised model (Figure 1.2) incorporating both personal standards and self-critical perfectionism was tested, the model failed to achieve an acceptable fit with the data. When another model was used whereby personal standards were the only measure of clinical perfectionism, not only were the fit indices slightly lower, but the paths between parental and coach conflict to personal standards were weaker, and the path between personal standards and self-esteem was nonsignificant. Moreover, the Akaike's Information Criterion (AIC) statistic value, which is often used to compare competing models, was also considerably poorer than the current model presented. Taken together, these findings suggest that the possession of high self-imposed standards may not be related to elevated eating psychopathology, especially in the context of competitive sport in which these individuals operate (athletes are required/expected to have high personal standards). Rather, what may be pathological or maladaptive is how these standards are evaluated when they are not met. This finding is in line with the ever-mounting research in which self-critical evaluations have been noted as the more salient clinical process, substantially accounting for the relationship between perfectionism and eating disorder symptoms (e.g., Dunkley, Blankstein et al., 2006; Egan et al., 2011; Fenning et al., 2008). Consequently, this finding questions Shafran et al.'s (2002) assertion of the personal standards subscale as one of the closest measure of clinical perfectionism.

Finally, the present model indicates that the psychopathological process of clinical perfectionism and self-esteem both seem to exert an indirect effect on eating psychopathology, while depression exerts a direct effect. Specifically, the relationship between self-critical perfectionism and eating psychopathology was explained by self-esteem and depression. Similarly, the association between self-esteem and eating psychopathology was mediated by depression. These aforementioned links are partially consistent with Dunkley and Grilo's (2007) findings that low self-esteem and depressive symptoms partially mediate the relation between self-critical perfectionism and over evaluation of shape and

weight, as well as other research findings whereby self-esteem was noted to interact with perfectionism (e.g., Steele et al., 2007) and depression (e.g., Courtney et al., 2008) in facilitating unhealthy eating behaviours. However, Dunkley and Grilo's reported that self-critical perfectionism was also directly linked to depression and eating psychopathology, however the final model of this study did not show such associations.

The second objective of this study was to test the applicability of the final model across different groups of athletes. In accordance with the second hypothesis, the patterns of the proposed associations were relatively similar across athletes who participate in different sport types (individual versus team) and performance standards (elite versus nonelite). These results suggest that the presently tested constructs of the transdiagnostic cognitive behavioural theory may explain eating psychopathology equally well with athletes who perform in different sports and at different performance standards. To the author's knowledge, this is the first study to examine this question. The results are valuable, as they further strengthen the predictions of the transdiagnostic cognitive-behavioural theory of eating disorders and suggest that these processes are robust *within* and *between* populations. Moreover, the findings of this study indicated that elevated eating psychopathology may arise regardless of the sport in which one participates and the level of competition. Therefore, engagement in sport may not be a precursor to unhealthy eating behaviours, but a context in which eating psychopathology may unravel.

The findings of the multigroup analyses, however, highlighted that the development of eating psychopathology differed across gender. More specifically, the proposed model achieved an adequate fit for female athletes but failed to achieve an adequate fit for males. Although this was not expected and is inconsistent with Fairburn's (2008a) position that the processes involved in eating disorders are the same for males and females, the findings were not surprising given the significant gender differences detected in study variables by the multivariate analyses of variance. Moreover, the transdiagnostic theory was formulated mainly on clinical observations of patients with diagnosed eating disorders and previous empirical studies on eating disorders. Consequently, it can be assumed that a large portion of these observations were based on females, as females are considered at increased risk of developing eating disorders than males (see Jacobi, Hayward et al., 2004). Therefore, it is possible that the constructs related to the transdiagnostic cognitive-behavioural theory may be

more relevant to the female population. These, however, are open empirical questions in need of further evaluation.

In an attempt to understand how and where the processes differ for male athletes, alternative models were tested. The analysis revealed that although the directional path of the psychopathological processes of self-criticism, self-esteem, and depression for the onset of elevated eating psychopathology remained virtually unchanged, the influence of athletes' perceptions of relationship quality (support and conflict) with their coach was made redundant. It seems that for male athletes, only the perceived levels of parental support and parental conflict were involved in their eating psychopathology. Plausible reasons for the absence of the coach-athlete relationship on the eating psychopathology of male athletes include the following. First within the current sample, female athletes had been training with their coaches for a longer period of time than their male counterparts, and thus it is possible that as male athletes had been training with their coach for a lesser length of time, they did not view their relationship with their coach as that important. Second, it has also been suggested that female athletes have a tendency to value the emotional interactions with their coaches more than male athletes, while male athletes value their coach's ability to coach effectively and provide technical expertise (Stewart, 2000). Thus it could be suggested that within the current sample, female athletes were more sensitive to the dynamics of the relationship with their coach than male athletes, resulting in the coach-athlete relationship posing a more significant influence on female athletes' eating psychopathology. However, further research is warranted.

Despite the notable strengths of this study (e.g., large representative sample size, conducting multi-group invariance analyses), when interpreting the study findings, caution should be exercised due to the following limitations. First, the study was cross-sectional in nature; therefore, the conclusions drawn are only speculative and are not illustrative of casual patterns. As attachment develops in infancy, it could be speculated that interpersonal difficulties influence eating psychopathology via the effects of self-critical perfectionism, self-esteem, and depression however, it is also possible that eating psychopathology may indirectly influence attachment styles via such processes as well, as attachment styles are not fixed in a deterministic manner throughout life (Bowlby, 1973). This suggests that there may be bi-directional relations between interpersonal difficulties, clinical perfectionism, self-esteem, depression, and eating psychopathology. As such the alternative model was tested, producing similar fit indices, as well as similar AIC statistic. Thus future studies should seek

to employ a prospective approach to determining the extent to which the onset of athletes' eating psychopathology can be explained by the processes highlighted in the transdiagnostic model, as well as to explore the directionality of such relationships.

There are also limitations related to the operational definitions and measurement of some of the constructs related to the transdiagnostic model. While Fairburn et al. (2003) outlined the importance of long-term interpersonal difficulties relative to eating disorders, the information describing the concept of long-term interpersonal difficulties was not sufficient enough to delineate the specific constructs associated with it. Thus, the current thesis extended the description of long-term interpersonal difficulties to capture enduring, internal, dispositional interpersonal difficulties. Subsequently, attachment theory was employed in this study as a means of capturing dispositional interpersonal difficulties through the constructs of attachment styles (specifically insecure attachment styles). It should therefore be noted that attachment styles are one of many indicators that could potentially capture the concept of long-term interpersonal problems as conceptualised in the transdiagnostic cognitive-behavioural theory. Moreover, Fairburn et al. proposed the concept of mood intolerance in relation to individuals with eating disorders to highlight their vulnerability and intolerance to several negative mood states including anxiety and anger. In this study, only one aspect of the concept of mood intolerance was captured. Specifically, mood intolerance was measured by perceived levels of depressive symptoms, thereby not fully capturing the construct of mood intolerance. Third, the present study employed self-report measures; therefore, results are subject to social desirability and acquiescence response bias. Finally, the present study did not use a control group of non-athletes and a sample of athletes with eating disorders. Therefore it remains unclear whether the relationships observed in this study would extend to the non-athletic population or to populations with diagnosed eating disorders. The present study could not have explored the aforementioned associations in such a special population due to the small number of athletes scoring within the clinical significance range indicative of eating disorders ($n = 45$). As such, future studies should seek to replicate the present study with a sample of non-athletic controls and a sample of athletes with a diagnosed eating disorder.

8.5. Conclusion

The findings of the current study have extended our understanding of the potential risk factors associated with eating psychopathology among athletes. First, the results have highlighted that the transdiagnostic cognitive-behavioural theory of eating disorders has the potential to accurately map the processes that are involved in eating psychopathology in a sample of athletes. These findings further suggest that athletes may be susceptible to increased eating psychopathology via the same processes as non-athletes, and eating disorders in athletes are likely to not be a *direct* consequence of their athletic participation. Second, it has demonstrated that the process of developing elevated eating psychopathology may be the same regardless of the sport type and performance standard of athletes. Third, these findings have extended our understanding of the content and functions of clinical perfectionism and interpersonal difficulties as they pertain to eating psychopathology. More specifically, the results illustrate how various indices of interpersonal difficulties conspire among themselves and with other psychopathological processes to illicit eating psychopathology as well as revealing that self-evaluative perfectionism is more highly involved in eating psychopathology. Although eating disorders as a topic present researchers (and clinicians) with a number of challenges, by continuing to develop a more encompassing understanding of the risk factors associated with eating disorders in athletes (e.g., examining psychosocial risk factors in addition to the sport-specific risk factors), we may come a step closer in being able to prevent, manage, and treat the disorder within the broader sporting community.

GENERAL DISCUSSION

9

General Discussion

The studies reported in this thesis examine the prevalence and the psychosocial correlates of British athletes' eating psychopathology, adopting the recommendations outlined by Petrie and Greenleaf (2007). In particular, this thesis examined the prevalence of eating disordered psychopathology using a psychometrically sound questionnaire amongst a large representative sample of British male and female athletes competing at the elite, developmental, and recreational standard, as well as a control group of non-athletes for comparison. In addition, guided by the processes highlighted in the transdiagnostic cognitive behavioural theory (Fairburn et al., 2003), this thesis examined the psychosocial processes associated with athletes' eating psychopathology. An outline of the findings generated from each of the studies presented in this thesis is described in Table 9.1.

9.1. Contribution of Results to Theory and Research

The findings generated in this thesis make a significant contribution to theory and research in both sport and the broader psychology domain. Specifically, the examination of the prevalence of eating disorders between a variety of performance standards (i.e., elite, developmental, recreational) provides a clearer account of the universality of eating disorders within the British athletic population. Furthermore, the inclusion of psychosocial risk factors that is grounded in theory (i.e., Fairburn et al., 2003) and other relevant empirical research further elucidates our understanding of the aetiology of eating disorders amongst athletes. Finally, this thesis makes a significant contribution to the transdiagnostic cognitive behavioural theory (Fairburn et al., 2003) by addressing the identified limitations of this framework. These key contributions, as well as their implications for theory and research will be discussed in the following paragraphs.

Table 9.1. An outline of the findings generated in the thesis.

Study	Aims and Procedure	Results
Study 1 (Chapter 3)	<p>To identify the levels of eating disordered psychopathology and engagement in key eating disordered behaviours amongst a sample of British elite, developmental, recreational athletes ,and a control group of non-athletes.</p> <p>To identify the prevalence of potential cases of eating disorders amongst a sample of British elite, developmental, recreational athletes, and a control group of non-athletes.</p> <p>To explore gender and sport type differences in the eating disordered psychopathology scores, engagement in key eating disordered behaviours and prevalence of potential cases of eating disorders <i>between</i> and <i>within</i> a sample of British elite, developmental, recreational, and non-athletes.</p>	<p>Recreational and non-athletes reported greater eating disordered psychopathology than elite and developmental athletes. Although there was no significant difference in the prevalence of potential eating disordered cases or engagement in compensatory weight control behaviours between elite, developmental, recreational and non-athletes, a higher percentage of non-athletes and recreational athletes were classified as potential cases with clinical eating disorders.</p> <p>Results revealed significant gender and sport-type differences in the eating psychopathology scores across performance standards, however, there were no significant gender and sport-type differences in the prevalence and engagement in compensatory weight control behaviours between these performance standards.</p> <p>Finally, significant gender and sport-type differences were detected in the eating psychopathology scores, prevalence and engagement in pathogenic weight control methods (i.e., binge eating) within each performance standard, with the prevalence of eating disorders higher amongst elite female athletes and female non-athletes than their respective counterparts. In addition, a higher number of male non-athletes reported engaging in binge eating than their female counterpart. Additionally, a higher number of male athletes involved in team sports reported engaging in binge eating than their male counterparts involved in individual sports at the elite level. While at the developmental level a higher number of male athletes involved in ball sports, and team sports reported engaging in binge eating than their male counterparts engaging in endurance and individual sports.</p> <p>Overall, the findings from Study 1 indicate that while there was no significant difference in the prevalence of potential eating disorders amongst elite, developmental, recreational athletes, and non-athletes, recreational athletes (both male and female, regardless of sport type) and female non-athletes are at increased risk of developing eating disorders than developmental and elite athletes.</p>
Study 2	<p>To examine the association between situational interpersonal difficulties (i.e., relationship quality with parents, coaches and teammates), and dispositional interpersonal difficulties (i.e.,</p>	<p>Results first revealed that situational interpersonal difficulties as captured by relationship quality with parents and coaches were associated with athletes' eating psychopathology. However, the quality of the relationship with teammates was not related to athletes' eating psychopathology.</p>

(Chapter 4 and 5) attachment styles) and athletes' eating psychopathology.

To explore the mediating role of clinical perfectionism, self-esteem, and depression in such associations.

Study 3
(Chapter 6)

To examine the association between situational interpersonal difficulties (i.e., relationship quality with mother, father, and coaches) and dispositional interpersonal difficulties (i.e., social anxiety and loneliness) and eating psychopathology amongst British athletes and non-athletes.

To explore the mediating role of clinical perfectionism, self-esteem, and depression in such associations.

To examine whether situational or dispositional interpersonal difficulties are more predictive of athletes' and non-athletes' eating psychopathology.

Specifically, support received from coaches and parents was negatively associated to athletes' eating psychopathology, while conflict within the parental and coach-athlete relationship was positively associated to athletes' eating psychopathology. Results further revealed that dispositional interpersonal difficulties as captured by insecure attachment styles were positively related to athletes' eating psychopathology. However, the association between both situational and dispositional interpersonal difficulties were indirect and mediated via athletes' levels of self-critical perfectionism, self-esteem, and depression. While self-critical perfectionism, self-esteem, and depression were found to equally contribute to transferring the effect of situational interpersonal difficulties to athletes' eating psychopathology, self-esteem and depression were identified as more salient mediators than self-critical perfectionism in the association between dispositional interpersonal difficulties and eating psychopathology. Finally, personal standard perfectionism was not correlated to athletes' eating psychopathology.

Overall, the findings from Study 2 indicate that both situational and dispositional interpersonal difficulties are indirectly related to athletes' eating psychopathology via self-critical perfectionism, self-esteem, and depression. Moreover, self-critical perfectionism appears to be more integrally associated with eating psychopathology than personal standards perfectionism.

Results from this study first revealed that in the case of athletes that situational interpersonal difficulties, as captured by perceived levels of autonomy support from fathers, dispositional interpersonal difficulties, as captured by social anxiety and loneliness, were associated to eating psychopathology. Interestingly, situational interpersonal difficulties, as reflected in the quality of relationship with the mother and coach, were not associated to athletes' eating psychopathology. Results further revealed that the association between father autonomy and loneliness was indirect and mediated by athletes' levels of depression, while the association between social anxiety and eating psychopathology was complementary mediated by athletes' levels of depression. Moreover, depression was identified as the more salient mediator between interpersonal difficulties and athletes' eating psychopathology.

In the case of non-athletes, results revealed that situational interpersonal difficulties as captured by perceived levels of autonomy support from mothers, perceived levels of involvement from mother and father, dispositional interpersonal difficulties as captured by social anxiety and loneliness were related to eating psychopathology. However, such associations were again indirect, with self-

critical perfectionism, self-esteem, and depression performing as equally robust mediators in associations between mother autonomy support, mother involvement, social anxiety, loneliness, and eating psychopathology. In the association between father involvement and eating psychopathology, only self-critical perfectionism and self-esteem were identified as accounting for the transferring the effect of father involvement to athletes' eating psychopathology. Finally, the findings of this study revealed that dispositional interpersonal difficulties were stronger independent predictors of eating psychopathology amongst athletes and non-athletes than situational interpersonal difficulties.

Overall, the findings from Study 3 suggested the association between situational and dispositional interpersonal difficulties and eating psychopathology amongst athletes and non-athletes are indirect, with dispositional interpersonal difficulties highlighted as the salient independent predictors of eating psychopathology amongst both groups. The findings further suggested that the processes and mechanisms involved in athletes' eating psychopathology strongly resemble the processes associated with non-athletes eating psychopathology, although there are some subtle differences (e.g., mediating variables, quality of mother-child relationship).

Study 4
(Chapter 7)

To examine the prospective role of situational interpersonal difficulties (i.e., relationship quality with parents, coaches, and teammates), and dispositional interpersonal difficulties (i.e., attachment styles) on athletes' eating psychopathology.

Results revealed that only situational interpersonal difficulties as reflected by relationship quality with coaches and teammates were related to athletes' eating psychopathology, over and beyond athletes' initial eating psychopathology, while situational interpersonal difficulties as captured by the quality of the parental relationship and dispositional interpersonal difficulties as captured by attachment styles were not. In particular, perceived levels of support received from coaches and teammates were negatively associated to athletes' eating psychopathology, while perceived levels of conflict were positively related to athletes' eating psychopathology. However, collating the influence of both these relationship dyads revealed that perceived levels of conflict experienced in the coach-athlete relationship was the salient independent predictor of athletes' eating psychopathology.

Overall, findings from this study demonstrated that while both the coach-athlete and teammate-athlete relationship has the capacity to predict athletes' eating psychopathology, only coach conflict is a risk factor for athletes' eating psychopathology.

Study 5

To test the applicability of components related to the

The findings generated suggest that the processes of interpersonal difficulties, self-critical

(Chapter 8)

transdiagnostic cognitive-behavioural theory of eating disorders within an athletic population.

To explore the applicability of the tested model across gender, sport type and performance standard.

perfectionism, self-esteem, and depression are applicable and could potentially be used to help explain eating disorders in athletes. Specifically, the results revealed that avoidant attachment was associated with the quality of the parental and coach-athlete relationships (characterised by perceived support and perceived conflict). As such, perceived levels of conflict in both the parental and coach-athlete relationship were positively associated to perceived levels of self-critical perfectionism, which in turn was negatively linked to low self-esteem. Subsequently, self-esteem was negatively associated to depression, which in turn was positively associated to athletes' eating psychopathology. Results further revealed that the aforementioned patterns were relatively similar across athletes who participated in different sport types (individual versus team) and performance standards (elite versus non-elite), but not across gender. Specifically, while the proposed model seemed to be applicable to explain female athletes' eating psychopathology, it did not do so for male athletes.

Overall, the findings from the final study suggest that the tested components of the transdiagnostic cognitive-behavioural theory of eating disorders has the potential to accurately map the processes that are involved in eating psychopathology in athletes. The findings further suggest that self-critical perfectionism may play a more salient role in athletes' eating psychopathology than personal standards perfectionism. Finally, the results suggested that the tested constructs of the transdiagnostic cognitive behavioural theory may explain eating psychopathology equally well with athletes who perform in different sports, and at different performance standards, as well as female athletes, but not for male athletes.

The athletic population is a unique and diverse population, composed of athletes with a broad range of sporting abilities, competing at various competitive levels, and in a wide range of sports. Accordingly, this thesis contains the first study to examine the prevalence of potential cases of eating disorders amongst British athletes competing in a variety of performance levels. Although the prevalence of eating disorders appears to be lower in the British athletic population in comparison to the British non-athletes, the expansion of this study to examine the prevalence of eating disorders between performance standards demonstrated that eating disorders are not confined to competitive level athletes. Rather eating disorders appear to be more prevalent in their less competitive counterparts participating in sport for recreational purposes, regardless of gender or sport type. This represents a significant step forward within the prevalence research domain, as research including recreational athletes is an uncharted territory. Rather researchers have primarily directed their focus on athletes competing at the elite or competitive level (e.g., Greenleaf et al., 2009; Sundgot-Borgen, 1993; Sundgot-Borgen & Torstveit, 2004). The results of this study suggest that participation in organised sports on a recreational basis may place individuals at a greater risk for eating disorders than participation in competitive organised sport. This could represent the potential societal change in the purpose of physical activity and exercise in health (Levitt, 2008). Specifically, engagement in sport and physical activity is considered to be synonymous with healthy lifestyles. However, as evidenced in this thesis, individuals may actually engage in recreational sport to lose, or manage their weight, or sculpt their bodies. This has some strong implications for research. In particular, the focus of research can now be expanded to investigate the salience and correlates of eating disorders amongst recreational athletes and compare whether they differ from competitive athletes.

The inclusion of both personal standards perfectionism and self-critical perfectionism to delineate clinical perfectionism as advocated by Fairburn et al. (2003) further clarifies our understanding of the content of clinical perfectionism. Specifically, it seems that self-critical perfectionism plays a more salient role in athletes' eating psychopathology than personal standards perfectionism. These findings lend further support to the overall conceptualisation of clinical perfectionism in terms that there is nothing maladaptive in striving for excellence in itself, instead it is when individuals' sense of self-worth is based almost exclusively on striving for high standards, and concern over mistakes in meeting these standards, that perfectionism becomes a "clinical" problem (see Egan et al., 2011). Furthermore, the

personal standards subscale of the FMPS (Frost et al., 1990) is considered one of the measures '*closest to the clinical concept of perfectionism*' (Shafran et al., 2002, p.777). However, the research contained within this thesis, contributes to the recent trend of research by Dunkley and colleagues (e.g., Dunkley, Blankstein et al. 2006; Dunkley & Grilo, 2007) which has highlighted self-evaluative items as better predictors of eating disorders. Thus, it can be argued that clinical perfectionism may be better measured by the self-evaluative measures than the self-imposed high personal standards measures. Therefore, the focus of future research should be directed to include these self-critical evaluative measures of perfectionism and their dysfunctional aspects when assessing clinical perfectionism in eating disorders.

Fairburn et al. (2003) highlighted the importance of interpersonal difficulties in the development and maintenance of eating disorders within their evidence based theory. Accordingly, the current body of research presented in this thesis not only highlights the importance of interpersonal difficulties in athletes' eating psychopathology, but also lends support to the justification of expanding the descriptions provided by Fairburn et al. to capture interpersonal difficulties. Specifically, the expansion of family interpersonal dynamics to reflect relationship quality with several significant relationship dyads (i.e., situational interpersonal difficulties), and the extension of long-term interpersonal difficulties to capture enduring, internal characteristics governing behaviour and cognitions (i.e., dispositional interpersonal difficulties) further enlightens our understanding of the content and nature of interpersonal difficulties. For instance by demonstrating significant links between situational interpersonal difficulties in terms of relationship quality with parents (in particular the father) and coaches and athletes' eating psychopathology, as found in Study 2 and 3, indicates that interpersonal difficulties are not just confined to family dynamics. Rather, difficulties in functioning within multiple interpersonal relationships appear to be linked to eating disorders.

Evidence of the significant role that a range of interpersonal difficulties (i.e., both situational and dispositional) may play in eating disorders has also been demonstrated by Study 2 and 3. Within the general population, the association between interpersonal difficulties indices and eating disorders has often tended to be addressed separately. Specifically, research has focused either on relationship dynamics (e.g., Calam et al., 1990) internal characteristics of the individual (e.g., Hartmann et al., 2010), adverse life events

(e.g., Kent et al., 1999) or interpersonal environments (e.g., Strober et al., 2000, 2001), separately. Moreover, the topic of interpersonal difficulties in relation to eating disorders within the athletic population has been primarily limited to the coach-athlete relationship (e.g., Biesecker & Martz, 1999; Jones et al., 2005) and social (i.e., coach and teammate) pressures (e.g., Rosen et al., 1986; Sundgot-Borgen, 1994). Thus, studies 2 and 3 represent initial empirical evidence for a quantitative link between a range of interpersonal difficulties and eating psychopathology. Subsequently, this has implications for research. Specifically, the extended conceptualisations of interpersonal difficulties offers researchers a more comprehensive understanding of interpersonal difficulties based on empirical evidence, as well as theory. These extended conceptualisations can now serve as a foundation upon which future research can be grounded. For instance, situational interpersonal difficulties reflect relationship quality with significant others. However, in the current body of research, the three key interpersonal relationships identified and examined include the parent, coach, and teammate. Therefore, this extended conceptualisation can now also be used to assess the importance of other significant relationship members such as close friends, partners, and siblings in eating disorders amongst athletes.

The inclusion of multiple interpersonal difficulties has also highlighted the aspects of interpersonal difficulties which may be important to the development of eating disorders, and how aspects of interpersonal difficulties conspire amongst themselves to potentially facilitate the development of eating disorders. This is noted as an inherent limitation of the transdiagnostic cognitive behavioural theory (see Schmidt & Treasure, 2006). Specifically, evidence for the predictive ability of situational interpersonal difficulties has been demonstrated in Study 4, with coach conflict highlighted as a potential risk factor for eating disorders amongst athletes. While interpersonal conflict as predictive of eating psychopathology is consistent with previous research within the general population (e.g., May et al., 2006), this represents a significant step forward within the eating disorder literature in the athletic population by moving beyond establishing statistical associations and using prospective studies to establish cause and effect. Moreover, the topic of conflict in relationships has been poorly addressed in the athletic population, with minimal attention paid to it (see Lavoie, 2007). Specifically, a series of studies have highlighted the detrimental effects of coach conflict on performance (e.g., Greenleaf et al., 2001), as well as on the termination of a coach-athlete partnership (e.g., Jowett, 2003). Thus, Study 4 not only

extends the current limited literature within the athletic population on interpersonal conflict, but also represents the initial empirical evidence for a prospective link between coach conflict and eating psychopathology. Therefore, it echoes the call by Lavoie for further research into interpersonal conflict in the athletic setting.

The examination of multiple interpersonal difficulties also brings to light the possible synergistic interplay between the different aspects of interpersonal difficulties as highlighted by Fairburn et al. (2003) in the onset and maintenance of eating disorders. In particular, the final study contained in the current body of research advocates that interpersonal difficulties can be viewed as an interaction of both dispositional and situational interpersonal difficulties, which collectively serve to facilitate the onset of eating psychopathology. Indeed many previous accounts have documented this interaction between situational and dispositional interpersonal difficulties (e.g., Hinrichsen et al., 2004; Kimbrel et al., 2008) as well as between other interpersonal difficulties examples provided by Fairburn et al. including adverse life events and situational interpersonal difficulties (e.g., Bodell et al., 2011). Thus, interpersonal difficulties can potentially be viewed as an interaction between multiple interpersonal difficulties (e.g., situational, dispositional, adverse life events) as opposed to the presence of one given example of interpersonal difficulties as outlined by Fairburn et al.

A number of researchers have highlighted that far too often studies have examined a singular pathway between interpersonal difficulties and eating disorders (e.g., Jones et al., 2006; Lacey & Price, 2004; O’Kearney, 1996). Rather, these authors suggest that there may be a multiple pathway in the link between interpersonal difficulties and eating disorders. Accordingly, the findings generated in studies 2, 3, and 5 further support this assertion. While this represents a significant step forward methodologically within the eating disorder literature within both the general and athletic population, these studies further distinguished the mechanisms that are salient as mediators, as well as demonstrating the manner in which these identified mechanisms transfer the effect of interpersonal difficulties to eating psychopathology. Although these aforementioned studies contained in the present thesis provide evidence to suggest that self-critical perfectionism and self-esteem are both important mediators in the link between interpersonal difficulties and eating psychopathology, depression stands out as the most salient mediator, collectively in Study 2 and 3. Research examining the association between depression and eating disorders in the athletic population is limited, with only a handful of studies available (e.g., Bravata et al., 2003; Terry et al.,

1999). Moreover, research has, until now, tended to view depression as an independent predictor of eating disorders in athletes (e.g., Lane, 2003), as opposed to as a potential mediator. While replication of these findings is required, the findings of this thesis represent initial empirical evidence for depression as a principal mediator in the link between interpersonal difficulties (both situational and dispositional) and eating psychopathology in athletes. Consequently, these findings serve as a foundation upon which future research can extend on, by further examining the variables that transfer the effect of interpersonal difficulties to eating disorders.

The examination of the multiple pathways between interpersonal difficulties to eating psychopathology also exhibited the various modes in which these abovementioned mediating processes function. In particular, studies 2 and 3 of this thesis demonstrated that the independent processes of self-critical perfectionism, self-esteem, and depression simultaneously transfer the effect of both situational and dispositional interpersonal difficulties to eating psychopathology. However, the final study contained in this thesis advocated a more sophisticated linear relationship, where interpersonal difficulties undermined self-critical perfectionism, this then led to poor self-esteem, which was subsequently linked to high levels of depressive symptoms, which resulted in elevated eating psychopathology. Research examining such directionality of mediating variables within the current eating disorders literature is limited (e.g., Dunkley & Grilo, 2007). Thus this thesis provides novel evidence to suggest that each of the mediating processes of self-critical perfectionism, self-esteem, and depression can not only mediate the effect of interpersonal difficulties to athletes' eating psychopathology concurrently, but that they may also conspire amongst themselves to facilitate the onset of eating disorders amongst athletes.

The body of research contained in this thesis further promotes the recent trend of thought, which suggests that the underlying processes involved in eating disorders amongst athletes closely resemble the processes involved in eating disorders within the general population (see Scoffier et al., 2010). In particular, Study 3 of this research amplifies that the collective processes of interpersonal difficulties, self-esteem, self-critical perfectionism, and depression may be relevant to the onset of eating disorders amongst both athletes and non-athletes. While the inclusion of a non-athlete control group in this study represents a significant step forward methodologically, as often studies examining the potential risk factors of eating disorders in athletes have neglected to include such a group, these findings

can also serve to enable a better understanding of the processes involved in eating disorders amongst athletes. Moreover, in contrast to the current sport-specific eating disorder literature, this thesis emphasises the involvement of psychosocial processes in the development of eating disorders amongst athletes. Specifically, it highlights the need to consider possible risk factors beyond sport-specific factors in the aetiology of eating disorders, but also those that are grounded in, and supported by theory. As such this provides a foundation to build upon as well as directions for further research. As not all potential risk factors were included in this thesis (e.g., biological, developmental, sport specific), the generated findings of this thesis provide scope for further research which incorporates the generic risk factors, as well as the potential sport-specific risk factors.

9.2. Implications for Practice

While implications for practice have been provided for each of the studies in their assigned chapters, this section endeavours to bring them together in a more coherent manner. Although the topics under study are a relatively new area of exploration, the findings generated in this thesis have highlighted a number of themes that hold important implications for practice, namely for the recognition and identification of eating disorders amongst athletes, the treatment of eating disorders amongst athletes and the prevention of eating disorders in sports. These will be discussed in the following paragraphs.

Findings generated from Study 1 of this thesis suggests that although athletes may not be at increased risk for developing eating disorders, recreational athletes (regardless of sport type and gender) may be at higher risk than competitive athletes. Thus, special attention must also be paid to recreational athletes in relation to the identification and recognition of eating disorders. It is often the routine that competitive athletes undergo intensive medical screenings prior to the start of their season and accordingly information related to eating attitudes and behaviours, nutritional status, body composition, menstrual status in females as well as information related to psychological function (e.g., mood) and frequency and intensity of physical activities are gathered. During such time, experts (e.g., nutritionists, doctors, physiologists, sport psychologists) are able to determine whether an athlete is functioning appropriately (e.g., exhibiting any eating disordered symptoms or signs of poor nutritional status). However, it can be assumed that such provisions are not readily available for those competing in lower competitive levels for a number of reasons (e.g., funding, nature

of the recreational environment). Thus given that the findings of this thesis have demonstrated that recreational athletes appear to be at elevated risk for the development of eating disorders, it is deemed necessary to ensure that such provisions are made available to recreational athletes too.

The findings generated from Study 1 further imply that the EDEQ (Fairburn & Beglin, 1994) can be used as an effective screening instrument. Although the EDEQ still needs to be appropriately validated for use within the athletic population, given the reported reliability of the measure throughout the thesis, as well as within the current eating disorder literature within the general population (e.g., Mond et al., 2006, 2008), along with its wide use within clinical settings, it is likely that it can serve as a high-quality screening tool for probable cases of eating disorders amongst athletes. Moreover, given that it is relatively easy to administer and code, and does not need specialist training, staff at organisations providing sports can be trained in using the measure with individuals that they may be concerned about. Thus, this can lead not only to the early detection of potential problems, but also possibly prevent the development of more severe symptoms.

Identification of eating disorders amongst athletes is considered difficult due to the secrecy associated with the disorder, but also as the characteristics associated with the disorder (i.e., perfectionistic, goal-orientated, competitive, and overtly concerned with performance and body shape) are also highlighted as the characteristics required to be a 'good athlete' (Thompson & Sherman, 1999a), thus the findings generated from studies 2 and 5 offers a manner in which 'good athletes' can be differentiated from an athlete with a potential eating disorder. Specifically, one of the personality traits often linked to eating disorders and being a 'good athlete' is perfectionism, with those striving for excellence regardless of the consequences, and determined to be the best that they can be, highlighted as the athletes that coaches are looking for and as the characteristics evident in eating disorders (see Byrne & McLean, 2001; Jacobi, Hayward et al., 2004; Shafran et al., 2002; Thompson & Sherman, 1999b). However, the findings of this thesis imply it is not necessarily the possession of personal high standards that is maladaptive to eating disorders, but the negative self-evaluation that occurs when these goals are not met. Thus, by screening athletes for the type of perfectionism they hold (e.g., personal standards or self-critical) it may allow athletes with eating disorders to be differentiated more easily from those that are a 'good athlete'.

Findings from this thesis also imply that athletes may benefit from very similar treatment programmes as the general population. Specifically, Study 3 demonstrated that the mechanisms involved in athletes' eating psychopathology closely resemble non-athletes' eating psychopathology. Although this assertion requires further examination, it seems logical to suggest that athletes may benefit from the same treatments programmes as the general population. The leading treatments often advocated for eating disorders include Family Therapy (Dare & Eisler, 1997; le Grange, Agras, & Dare, 2001), Cognitive Behavioural Therapy (CBT; see Fairburn, 1981; Fairburn et al., 1993; Fairburn 2008b), and Interpersonal Therapy (Fairburn et al., 1993; Klerman, Weissman, Rounsaville, & Chevron, 1984). Although it is beyond the scope of this thesis to provide explicit details about each of the aforementioned treatment programmes (see Birchall, 1999; Fairburn, 2008b; Wilson, Grilo, & Vitousek, 2007 for more details), any of these treatments would seem to be beneficial to athletes given that they are outpatient based, structured therapy conducted over a course of several months (dependent on which treatment), ensuring that little disruption is made to athletes' training and competitive schedule as possible (unlike hospitalised treatments).

However, CBT has been highlighted as superior to other psychological treatments with which it has been compared to, at least in the short-term (Wilson & Fairburn, 2002; Wilson et al., 2007). Furthermore, IPT has been found to be comparable in its eventual effects, but is considered to take longer to act (Fairburn et al., 2003). More recently, another form of CBT termed Cognitive Behavioural Therapy –Enhanced (see Fairburn, 2008b for further details) which is based on the processes highlighted in the transdiagnostic theory (Fairburn et al., 2003) has been noted to be more efficacious than the original CBT (see Byrne et al., 2011). Specifically, in CBT-E the specific status of the eating disorder is not of any relevance, but rather the content of the treatment is dictated by the particular psychopathological features present and the processes that appear to be maintaining them (Fairburn et al., 2003). Thus, given the critical role of self-critical perfectionism, self-esteem, depression, and interpersonal difficulties highlighted in the current thesis, it would seem appropriate to assume that athletes may benefit more from receiving CBT-E as it contains 'modules' related to the treatment of clinical perfectionism, self-esteem, mood intolerance, and interpersonal difficulties.

The findings from the current thesis further suggest that the inclusion of parents, teammates and in particular the coach could potentially serve as a powerful tool in treatment.

Specifically, as studies 2, 3, and 4 have demonstrated the link between relationship dynamics with parents, coaches, and teammates and eating psychopathology, it would seem appropriate they are also included in the treatment. Although it must be ensured that these relationship members are not blamed for athletes' eating disorder, given the length of time that these relationship members spend with the athlete (especially the coach), it could be deemed appropriate to include them in treatment. The inclusion of these relationship dyads could not only assist recovery, but also help with understanding of the illness and its development, as there is evidence to suggest that eating disordered patients' outlook (on life, relationships, causes of eating disorders) is often biased by the disorder (e.g., Bonne et al., 2003; Sim et al., 2009). Furthermore, the sharing of information and advice on the management of the disorder could foster unity between the relationship members to work against the disorder, as opposed to each other, as often those close to eating disordered patients feel helpless and excluded from the therapeutic interventions, which could create more difficulties, inadvertently further exacerbating the disorder. Moreover, the inclusion of relationship dyads could ensure that the eating disordered patient does not feel that they are alone in dealing with the problem (which is often the case), but feel that they have a support network that they can rely on and trust, which has been suggested to be integral to recovery (e.g., Rorty et al., 1993). Finally, problems encountered within the aforementioned relationships can also be dealt with appropriately and constructively in a safe environment, in the presence of a trained professional, who can effectively facilitate these sessions without it turning into a blaming session.

Prevention and early intervention work into eating disorders amongst athletes can use the findings generated in this thesis to target specific psychosocial factors that place athletes at heightened risk for developing eating disorders, but also to target the subgroup of athletes recognised as being at increased risk. In particular, Study 1 demonstrated that out of all groups of athletes, competitive athletes are not necessarily at the highest risk for developing eating disorders, rather, recreational athletes (both males and females, regardless of sport type) are at increased risk of developing eating disorders. As such, these results suggest the need for primary interventions to target recreational athletes. Specifically, educational programmes and advice on the risks of eating disorders need to be provided to sport organisations, coaches, clubs, and others working with these athletes in general, as well as recreational athletes themselves. Such programmes should target the importance of

recognising the difference between normal 'athletic eating' and practices (e.g., training normal hours) and unhealthy eating behaviours (e.g., engaging in extra training in secret, having highly restrictive diets), provide a basic awareness of the physical and psychological problems associated with eating disorders, but also the effects of eating disorders on performance and more importantly on health. In providing such workshops, not only will coaches' awareness be raised about the size of the problem, but these programmes will also equip them with appropriate knowledge and skills (e.g., knowledge about referral systems, where to access treatment and support) enabling them to deal with such issues more appropriately and effectively should they arise with their athletes.

While it appears that recreational athletes are more susceptible to eating disorders than their competitive counterparts, it should be noted that eating disorders still pose a threat to the more competitive level athletes, in particular in relation to engaging in pathogenic weight control behaviours. Specifically, the results of Study 1 of this thesis have highlighted that elite and developmental athletes are more likely to engage in self-induced vomiting and excessive exercise (respectively), while recreational athletes are more likely to use laxatives. Accordingly, it is deemed appropriate that educational programmes targeting the dangers of engaging in such behaviours (e.g., weight loss does not guarantee improved performance) and the benefits of good nutritional practice are provided to athletes themselves. In providing some programmes, it is important that each programme is tailored to account for the subtle differences that exist between the different performance standards as well as within each performance standard (see Chapter 3 more details). For example, when providing workshops to elite athletes, it may be advantageous to place greater emphasis on the dangers of engaging in dietary restraint, and self-induced vomiting, while educational workshops provided for recreational athletes should have a greater emphasis on the dangers of using laxatives and engaging in binge eating. In addition, such educational programmes should make a conscious effort not to 'glamorise' eating disorders. Thompson and Sherman (1999b) noted that by providing athletes with information about eating disorders, there is the risk of the educational programmes inadvertently increasing the likelihood of them developing eating disorders, as athletes that are not currently engaging in, or aware of such behaviours may begin to use them as a strategy to enhance their performance.

In addition to early interventions and prevention programmes focusing on educating athletes and relevant support staff about the risks and consequences of engaging in eating

disorders, appropriate nutrition, and optimum physical and mental health, the findings of the current thesis further imply the need to target areas such as interpersonal difficulties, clinical perfectionism, self-esteem, and depression. Given the critical role of depression (even more so than self-esteem and self-critical perfectionism), self-esteem, and self-critical perfectionism in this thesis, it is deemed important that prevention and intervention programmes are also designed to tackle these areas. Specifically, by providing programmes that work on enhancing athletes' self-esteem, reducing the depressive symptoms and helping athletes to set realistic goals and develop appropriate ways in evaluating the set goals (if met or not), athletes' risk of developing eating disorders may be minimised.

It is also worthwhile, given the predictive role of the quality of the coach-athlete relationship and teammate-athlete relationship, that the athletic community is educated and made aware of the impact their interactions and behaviours may have on eating disorders. Specifically, it seems that the athletic community should encourage the development of high quality relationships between coaches and athletes, as well as between teammates and athletes. Thus, it may be advantageous that coaches and teammates get to know their athletes beyond their performance/athletic based relationship and take time to develop a meaningful relationship that promotes personal development. This could mean interacting with each other outside of the training sessions, or ensuring that within the allocated training sessions, there is also time for personal interactions and conversations. It also appears important that coaches and teammates foster rules and boundaries for the training and competing environment. For example, conflict in team sports may be related to favouritism (intentionally or unintentionally), or other athletes not taking sessions as seriously (e.g., turning up late). Thus by clearly setting rules and boundaries or the 'ten commandments' at the beginning of each season (to which every one contributes), this may inadvertently reduce conflict and tension between those involved, and help avoid situations where athletes, teammates, and coaches experience significant declines in the quality of their relationship, but also establish synergy and cohesion within the team/squads. Moreover, such prevention programmes should also aim to provide athletes with the appropriate resources in order to be able to better deal with problematic relationships, rather than turning to unhealthy eating practices as a means of dealing with relationship problems.

It is important that such programmes are not a 'one-off', but part of a long-term-prevention programme where the athletes who have received such workshops are followed up

and provided with the necessary support. This can be achieved by ensuring that support staff are also appropriately aware of the risks associated with eating disorders, as well as ensuring that athletes have access to dietitians, nutritionists, and sport psychologists readily. In addition, if athletes are engaging in any weight loss programmes, they need to be appropriately supervised. This would mean that those working with athletes (e.g., key stakeholders) are also in regular receipt of these educational workshops. In addition, it may also be beneficial for such organisations which offer recreational sporting activities to ensure that recreational athletes receive resources and support related to nutrition, appropriate exercising, and the risks of engaging in unhealthy behaviours built into their training programmes, like their competitive counterparts.

9.3. Strengths and Limitations of the Thesis

While the strengths and limitations of each specific study have been provided in their assigned chapters, the strengths and limitations of the thesis in general will be explained next. The studies presented in this thesis reflect the first work to examine the prevalence of potential cases of eating disorders amongst a large representative sample of British athletes, as well as the first work to use Fairburn et al.'s (2003) transdiagnostic theory within an athletic setting. Undoubtedly a key strength of this thesis is the use of a large representative sample. In particular, this thesis employed 1097 athletes in total, performing at various performance levels recruited from a variety of sports within United Kingdom. Consequently, this allows the findings generated from this thesis to be widely generalisable to the athletic population. In addition to the size and representativeness of the sample, the second notable strength was that a control group of non-athletes was employed for Study 1 and Study 3. This is important as previous prevalence studies have seldom employed a control group to make comparative deductions (e.g., Greenleaf et al., 2009; Petrie et al., 2008). Furthermore, the use a control group of non-athletes in Study 3 was deemed important in order to understand whether the processes involved in athletes' eating psychopathology are similar to those of the general population. Doing so, demonstrates a key strength of the thesis, as to the author's knowledge, no other studies have employed a control group in assessing potential risk factors in the eating disorder literature within the athletic setting.

Correspondingly, the inclusion of multiple relationship types that have been frequently highlighted to play a critical role in athletes' athletic experiences and development (e.g., parents, coaches, and teammates) and examining the association between both sets of

parents (mother and father) certainly adds to the strength of this thesis. Specifically, previous literature within the athletic setting has tended to focus on the coach-athlete relationship (see Jowett, 2003), while within the eating disordered literature the parent-child relationship has received the most attention, in particular the mother-child relationship (see Jones et al., 2006; McIntosh et al., 2000). Thus, the inclusion of multiple relationship types allowed a more comprehensive exploration of the role of various relationship partners in the eating psychopathology of athletes.

A further strength of this thesis is the fact that the psychosocial processes investigated were grounded in theory (e.g., Fairburn et al., 2003) and supported by empirical research within both the general and athletic population. Using a theory which incorporates several potential risk factors which were testable within one model has allowed further understanding of how these different mechanisms work together to potentially promote eating disorders. Furthermore, using this theory as a foundation has enabled the highlighted constructs to be generalised beyond the general population. This corresponds to the next strength of the thesis, in that the latter studies of this thesis examined the interactions between the variables under study, rather than focusing on independent predictors of eating psychopathology (see Lacey & Price, 2004). Specifically, multiple mediators were used to test the association between situational and dispositional interpersonal difficulties and eating psychopathology. This was deemed important as the existing literature has primarily focused on a single direct pathway between interpersonal difficulties and eating disorders, with minimal attention to the mechanisms that may underlie such associations (see Jones et al., 2006; O’Kearney, 1996). In addition, Study 5 tested the potential interaction between the mediating variables under study in relation to eating psychopathology, potentially highlighting the manner in which interpersonal difficulties, clinical perfectionism, self-esteem, and depression may interrelate with eating to facilitate the onset of eating disorders. Thus, the inclusion of multiple mediators and more specifically mediators that have established to be critical in eating disorders (see Dunkley & Grilo, 2007), as well as highlighting the manner in which they interrelate reflects a clear advantage of this thesis.

Additional strengths of this thesis are related to the methodological design and statistical analyses employed in several of the studies. Specifically, the use of the bootstrapping mediation procedure as advocated by Preacher and Hayes (2004, 2008) is one such key strength. As previously mentioned in Chapter 2 of this thesis, the causal steps approach as outlined by Baron and Kenny (1986) is the most commonly advocated and

widely used meditational analytical procedure. However, despite its common usage in research, this approach is considered not to be suitable for testing the effect of multiple mediators simultaneously. Thus the use of Preacher and Hayes approach in this thesis (a) ‘purified’ the indirect effects by controlling for all the other mediators; (b) reduced the alpha inflation that would have resulted from using a series of single mediator models; and (c) determined which of the mediators investigated were more relevant than others. Moreover, a prerequisite of the causal steps approach is the need for a direct relationship between the IV and the DV, however Preacher and Hayes as well as other authors (see Mackinnon et al., 2000; Shrout & Bolger, 2002; Zhao et al., 2010) proposed that this direct relationship is not necessary for detecting whether mediation exists and that the IV can still be related to the DV indirectly through the intervening variables. Thus, if the procedure as outlined by Baron and Kenny had been followed in this thesis, some of the analyses would not have been conducted due to the finding of a non-significant direct effect (i.e., coach-conflict and athletes’ eating psychopathology in Study 2; father autonomy support and athletes’ eating psychopathology in Study 3).

Similarly, the use of structural equation modelling is a further strength of the current thesis. Specifically, the use of structural equation modelling allowed the main constructs of the transdiagnostic cognitive behavioural theory to be simultaneously assessed, which traditional multivariate analyses are not capable of (Kline, 2005). The use of a longitudinal/prospective research design to identify the risk factor status of both situational and dispositional interpersonal difficulties is another key strength of this thesis and builds upon the current eating disorder literature within both the general population and the athletic population. In particular, the majority of the current studies focusing on interpersonal problems and eating disorders have employed a cross-sectional design, often retrospectively too, thus making it difficult to discriminate between cause and effect, as well as being subject to inaccurate recall (see Jacobi, Hayward et al., 2004; Striegel-Moore & Bulik, 2007). Thus, the inclusion of a longitudinal design allowed the identification of true risk factors of eating disorders in athletes.

Despite the aforementioned strengths of this thesis, there are also some limitations that need to be addressed. The first limitation of this thesis is that the data was collected via self-report measures and consequently is subject to the inherent limitations underlying self-report measures, such as subjectively measured data, potential misunderstanding of wording,

and response bias. In addition, self-report measures are often administered on the grounds that the individuals “have access to the psychological property that the researcher wishes to measure” and that the participants “are willing to report that property” (see Judd & McClelland, 1998, p. 202). However, it has been suggested that individuals may not possess that kind of self-awareness about why they do the things that they do (see McDonald, 2008) and consequently this has the potential to affect their response. Furthermore, it has been suggested that employing self-report measures to assess sensitive issues such as eating disorders provides inaccurate data due to the stigma associated with the topic, especially in athletes as they are afraid of losing their position on their team/squad or losing funding if they reveal such information (see Beals, 2004). Thus, as the data generated from the self-report measures were not further examined by other alternative methods (e.g., follow up interviews), this reflects a limitation in the methodology design.

However, due to the nature of the study (e.g., exploratory) and the number of participants recruited, the use of more objective methods were not feasible. Moreover, certain procedures were undertaken to ensure that the data generated was as accurate as possible. For example, only self-report measures that had previously been used with non-clinical samples (either within the athletic or the general population), with established psychometric properties were included in this thesis. Moreover, in an attempt to ensure that athletes’ and non-athletes’ data would remain anonymous and confidential, athletes did not complete their questionnaire in the presence of their coach or other personnel; both athletes and non-athletes were given the opportunity complete the questionnaire in their own time and in private (e.g., at home). While the use of self-report measures is marked by some limitations, they also offer some advantages and as such they should also be noted. Firstly, the use of self-report measures are cost effective, are less time consuming, and easy to administer. Secondly, they are considered to facilitate disclosure in some eating disordered patients who may be ashamed or embarrassed about their condition (see Dunkley & Grilo, 2007).

A subsequent limitation is the methodological design of several studies. In particular, studies 2, 3, and 5 were cross-sectional. Thus conclusions about causality cannot be drawn and it is unclear whether the direction of the relationships highlighted in these studies is accurate. Nonetheless, cross-sectional studies are considered to represent the first critical step in determining potential risk factors (see Jacobi, Hayward et al., 2004) and given the nature of the thesis (e.g., exploratory) it was deemed appropriate to employ this design in this

instance with idea that further research should employ prospective and experimental studies to complement the generated findings.

A further limitation relates to the characteristics of the sample and more specifically the generalisability of the accumulated findings. While a large representative sample size was recruited for the majority of the studies, they were nonetheless composed predominantly of British Caucasian females, thus suggesting that the results may not be relevant to other ethnic populations, males, and non-westernised countries. Furthermore, the empirical support for the theory, which guided much of the psychosocial processes examined in this thesis were primarily drawn from the general population. Accordingly, it is important to recognise that much of this research has been primarily conducted with westernised, Caucasian females too, and as such the generated findings may apply more closely to female athletes. Secondly, although significant associations were detected between the variables under examination in this thesis, the magnitude of the associations presented were modest and in most cases small. Moreover, the scores of the eating psychopathology scores were often small, indicating a healthy sample, therefore it is unclear where the observed patterns would extend to clinical samples. Nonetheless, given the exploratory and novel nature of the study, it should be considered as a starting point for further research.

Finally, this thesis only focused on the psychosocial processes considered to be involved in eating disorders. However, it should be noted that eating disorders are multifaceted disorders, composed of complex interactions among biological, environmental, psychological, familial, and developmental factors (Pike et al., 2008). Subsequently, this is a critical limitation of this thesis, in that it did not consider the other potential factors linked to eating disorders (e.g., biological, genetics, behavioural, socio-cultural). However, the incorporation of the other factors requires a more complex methodology which was not within the scope, nor the timeframe of this thesis. Moreover, given the lack of systematic research conducted on the potential risk factors of athletes' eating psychopathology outside of sport-specific risk factors, it was deemed appropriate to start the focus on the psychosocial factors, upon which future research should seek to expand.

9.4. Future Directions

Potential future directions have been provided for each of the studies in their assigned chapters, however further details are provided below.

The findings generated from this thesis suggest that athletes (regardless of performance standard) are no more likely than the general population to report symptoms of eating disorders, although it seems that recreational athletes may be at increased risk than more competitive athletes. As research including recreational athletes in their sample is an uncharted territory, it is important to further investigate why recreational athletes are at elevated risk of developing eating disorders. However, as this is the first study to examine the prevalence of potential eating disorders cases amongst a large sample of British athletes competing at various performance standards, further studies replicating this methodology are also needed. Yet, given that the sole use of a questionnaire to detect cases of eating disorders has been criticised (see Sundgot-Borgen, 1993), future studies should seek to replicate the current findings employing the advocated two-stage procedure of assessment and diagnosis. Moreover, despite the study's considerable recruitment efforts, there was a poor response rate from athletes competing in few of the sport classification systems as defined by Sundgot-Borgen and colleagues (e.g., Sundgot-Borgen, 1993; Sundgot-Borgen & Larsen, 1993) such as power sports, technical sports, aesthetic sports, and weight class sports. Thus, Study 1 needs to be replicated employing athletes from all sport type groups before firm conclusions can be drawn as to whether all classification of sports are equally at risk of eating disorders.

Given the variation in prevalence rates in the current sample of athletes in comparison to previous studies conducted in other westernised countries (e.g., Greenleaf et al., 2009; Petrie et al., 2008; Sundgot-Borgen & Torstveit, 2004), this presents a further avenue for investigation. Employing the two-stage procedure of assessment and diagnosis, future prevalence studies should seek to include data from multiple sites from various countries. Specifically, using athletes representing various performance standards (e.g., elite, developmental, recreational) as well as a control group of non-athletes (those that do not partake in physical activities) and exercising non-athletes (e.g., gym goers) from other westernised countries (e.g., USA, Australia, Norway) and non-westernised countries (e.g., Kenya, China) to examine whether the prevalence of eating disorders is higher amongst athletes in certain countries than others. In doing so, it will provide a more comprehensive outlook on the universality of the phenomenon across various cultural and global contexts as well as explore other variables that were not possible in the current study (e.g., ethnicity).

The findings generated from the series of studies (i.e., Studies 2 and 3) examining the association between situational and dispositional interpersonal difficulties and eating

psychopathology have revealed that both situational and dispositional interpersonal difficulties are indirectly related to eating psychopathology. However, although males and females were included in these studies, analyses were not done separately for males and females for a number of reasons (e.g., not within the scope of the thesis; a small sample size of males in Study 3). As such, this presents an area that warrants further investigation. Specifically, while the effect of gender was statistically controlled for in these analyses, it is unclear whether the highlighted pattern of relationships is specific to females (given the large number of females recruited as well the commonality of the problem within females) or whether they would extend to male athletes too. Although Fairburn (2008a) proposed that the processes involved in eating disorders are universal across gender and age, as demonstrated by Study 5 of this thesis, there appear to be some gender differences in the mechanisms involved in the eating psychopathology of athletes. Therefore, the replication of the present findings amongst male and female athletes separately is deemed important, as it would further enhance the understanding of the mechanisms involved in athletes' eating psychopathology, as well as demonstrate whether the mechanisms involved differ for males and females which could ultimately help guide the formulation of specific treatment interventions and programmes for male and female athletes (should they differ).

The longitudinal design employed to assess the risk factor status of both situational and dispositional interpersonal difficulties in Study 4 adheres to the guidelines proposed by Kazdin et al. (1997) and Kramer et al. (1997) where for a risk factor to be established, temporal precedence needs to be demonstrated between the risk factor and the outcome of interest (Kazdin et al., 1997). However, with the nature of risk factors subject to change, findings from a single longitudinal study are not sufficient to secure its status as a strong risk factor for the outcome of interest (Jacobi, Hayward et al., 2004). Therefore, given that Study 4 represents the first study to the author's knowledge, to employ a longitudinal design to examine the link between interpersonal problems and eating disorders amongst athletes, the generated findings must be replicated in future studies employing a longitudinal design. Consequently, such replications would strengthen the risk-factor status of interpersonal difficulties. Another method of establishing the status of variables as risk factors according to Kazdin et al. (1997) and Kraemer et al. (1997) is the use of experimental designs, whereby the risk factor under study is manipulated and its effects on the outcome variable of interest is evaluated. As such, this is said to enable the identification and establishment of the true

causal risk factors (see Jacobi, Hayward et al., 2004; Kazdin et al., 1997; Kraemer et al., 1997). Thus, future studies should also seek to employ an experimental design in assessing the link between interpersonal difficulties and eating psychopathology as this would (a) further strengthen the status of interpersonal difficulties as a potential risk factor of athletes' eating psychopathology, (b) provide a more objective measure of the variables under study by moving beyond the reliance on self-report measures, and (c) aid the formulation of treatment and prevention programmes for athletes.

Interpersonal difficulties have often been considered a correlate of eating disorders and psychopathology in general, due the observation that interpersonal difficulties are often apparent in a number of psychopathologies, not just in eating disorders (see Erol et al., 2007; Jacobi, Hayward et al., 2004; Pike et al., 2008). Thus, future studies should seek to examine the specificity of interpersonal difficulties as a risk factor of athletes' eating psychopathology by including other potential psychopathologies (e.g., depression, OCD) in studies. Doing so will help in the formulation of treatment and prevention programmes that are specifically designed to combat eating disorders.

The findings generated in the final study of this thesis demonstrated that the tested components of the transdiagnostic cognitive behavioural theory have the potential to explain the processes involved in athletes' eating psychopathology. However, given that the present study only tested some of the related constructs of the model (e.g., the presence of depression than mood intolerance, two aspects of interpersonal difficulties), future studies should seek to replicate the current findings by employing the Distress Tolerance scale (Corstorphine et al., 2007) which has been recently used to capture mood intolerance (Byrne et al., 2011) as well as the other examples of interpersonal difficulties (e.g., adverse life events). In addition, as demonstrated by Study 4 of the current thesis it may be beneficial to include other relationship dyads (e.g., teammates) in the study. In doing so, the processes highlighted in the model as a whole could be tested. While the tested model in the thesis incorporates many of the psychopathological processes highlighted to be involved in eating disorders, it has nonetheless only focused on the psychosocial factors; it has not included other potential risk factors (e.g., biological, developmental, sport-specific) and as such serves as a foundation for future studies to build upon. Thus, the inclusion of other potential risk factors (both generic and sport specific) and testing the pathways between these variables will allow the formulation of a more comprehensive aetiological model of eating disorders for athletes,

which will further aid the understanding of whether and how these variables increase the risk of eating disorders within the athletic community (see Petrie & Greenleaf, 2007).

Further to these specific ideas, there is scope to extend the studies contained in the current body of research by expanding the methodological approaches employed. Specifically, four of the five studies in this thesis employed a cross-sectional approach, which only provides a snap-shot of the problem under study. Thus, extending these studies using a longitudinal design will add more merit to the generated findings. For instance, the extension of the current prevalence study to a longitudinal study will not only provide a more accurate picture of the problem, especially as it pertains to the cause and effect relationships between sport type, competitive level, and eating disorders, but it will also provide the initial investigation of the course and incidence rates of eating disorders amongst athletes. Likewise, as the causes of eating disorders are said to be multifactorial (Pike et al., 2008), it cannot be assumed that interpersonal difficulties on its own predicts eating disorders as evidenced in Study 4 of this thesis. Furthermore, as highlighted in studies 2 and 3, both situational and dispositional interpersonal difficulties appear to be indirectly related to athletes' eating psychopathology via the mediating variables of self-critical perfectionism, self-esteem, and depression. Therefore, it is also important to examine the causal chains between these variables, as well as explore the issue of linearity in future studies using a longitudinal design. In particular, a four wave longitudinal study appears necessary, where interpersonal difficulties, clinical perfectionism (measured by both personal standards and self-criticism), self-esteem, depression, and eating psychopathology are measured concurrently across these time points. In doing so, a clear picture of the direction between these abovementioned variables will be demonstrated.

9.5. Concluding Remarks

Since the 1980s, researchers, national organisations, coaches, and athletes have acknowledged the effect of eating disorders not only on athletes' performance, but also on their health, and general wellbeing. Consequently, driven by the gaps identified in the current literature (Petrie & Greenleaf, 2007), the present thesis makes a significant contribution in bridging these gaps, by furthering our understanding of the size of the problem within the British sporting population, as well as providing an insight into the correlates of the disorder. Specifically, it highlights the need to consider psychosocial factors

in the development of eating disorders amongst athletes. Although further research is required replicating the findings generated in this thesis, the current body of research provides a platform upon which interventions and prevention strategies can be formulated, aimed at reducing the risk of eating disorders in sport.

The environment in which athletes operate is highly competitive, demanding, and stressful, with the ultimate goal of performance success and athletic development at the heart of it. However, it can be argued that the performance demands placed on athletes are only likely to become more taxing (e.g., greater pressure to win at all costs). Therefore, in order for us to minimise and reduce the impact on eating disorders within the athletic domain, and allow athletes to perform to their maximum both physically and mentally, the ongoing application of a research framework that moves beyond the examination of sport-specific risk factors, one that is grounded in and supported by relevant theories is imperative.

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APPENDICES

Appendix 1

Participant Information Sheet: Study 1 - Athletes



Eating Behaviours among British athletes and non athletes

Participant Information Sheet

You are being invited to participate in this research study, which is part of a PhD study at Loughborough University. Before you decide, it is important for you to understand why the research is being conducted and what it will entail. Please take the time to read the following information carefully and ask me if there is anything that you do not understand or that is not clear or if you require more information.

Thank you for reading this.

Who is doing this research?

This research is being conducted by Vaithehy Shanmugam, under the joint supervision of Dr Sophia Jowett of the School of Sport and Exercise Sciences and Dr Caroline Meyer of Loughborough University Centre of Research into Eating Disorders.

What is the purpose of the study?

I am investigating the occurrence of unhealthy eating attitudes and behaviours among British athletes and non athletes

Why have you been chosen?

You have been selected on the basis that you are a British athlete participating at either the elite, developmental or recreational level.

Do you have to take part?

It's up to you to decide whether you take part in this study. If you do decide to take part, you will be given this information sheet to keep and asked to sign a consent form. You are free to withdraw from the study at any time and do not have to give a reason. A decision not to take part or to withdraw at any time will not penalise you.

What will happen to you if you choose to take part? What will you have to do?

If you are over 18, you will first complete the **informed consent form** and then complete the enclosed questionnaire pack, which assesses your weight, diet and eating behaviours. The completion of the questionnaire should not take longer than 15 minutes. Once completed, please return the questionnaires to the researcher in the sealed envelopes.

If you are under 18: what do you do?

If you decide to take part in the study, first you will need parental consent. Please get one of your parents to sign the **parental consent form** to say that they give permission for you to participate in the study, but also complete the **willingness to participate form** yourself as well. Once this is done, then complete the questionnaire pack.

What are the possible disadvantages of taking part?

By taking part in this investigation, you will have the opportunity to open up and reveal personal issues that may have a negative effect on you and you may experience unhappiness. However, be assured that the research is anonymous, confidential and voluntary and help will be offered, should you feel you need it.

What are the possible benefits of taking part?

I hope that participating in this study will be beneficial for you, as it is likely to act as a way to reflect on issues that may (or not) have concerned you recently. Please note that advice on gaining help will be offered if requested.

What happens when the research study ends?

Should you feel that you need advice or help, I am more than happy to recommend you suitable services. Additionally, if you would like to know the results of the research, I will be happy to send you a report of the findings, but please note that I will not be able to offer specific details pertaining to yourself.

What if something goes wrong?

No special compensation arrangements are in place in the extreme unlikely case that taking part in this research results in any negative effects for you. However, if you wish to discuss or complain about any aspect of the study, such as the way you have been approached or treated during the course of this study, please contact **Dr Sophia Jowett** (s.jowett@lboro.ac.uk) or **Dr Caroline Meyer** (c.meyer@lboro.ac.uk). Additionally the University has a policy relating to Research Misconduct and Whistle Blowing which is available online at [http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing\(2\).htm](http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm).

What will happen to the results of the research study?

The results will be published as part of a PhD thesis and it is anticipated that the findings will be published in a sports or medical journal. You will be notified of how to obtain results once the study is completed (if requested). The results may also be presented at conferences. In all instances, no names or any other identifying features of participants will appear.

Who has reviewed the study?

The study has been subject to review by experts in the field and ethical approval has been granted by Loughborough University.

Contact for further information

If you have any further questions, please contact:

Vaithehy Shanmugam

Dr Sophia Jowett

Dr Caroline Meyer

Tel: 01509228450

01509 226331

01509 223032

Email: v.shanmugam@lboro.ac.uk

S.jowett@lboro.ac.uk

C.meyer@lboro.ac.uk

Should you agree to take part in this study, you will be given this information sheet to keep, together with a copy of your signed consent form upon request.

Thank you for taking the time to consider participation in this study.

Appendix 2

Participant Information Sheet: Study 1 – Non-athletes



Loughborough University
Centre for Research into Eating Disorders

Eating Behaviours among British athletes and non athletes

Participant Information Sheet

You are being invited to participate in this research study, which is part of a PhD study at Loughborough University. Before you decide, it is important for you to understand why the research is being conducted and what it will entail. Please take the time to read the following information carefully and ask me if there is anything that you do not understand or that is not clear or if you require more information.

Thank you for reading this.

Who is doing this research?

This research is being conducted by Vaithely Shanmugam, under the joint supervision of Dr Sophia Jowett of the School of Sport and Exercise Sciences and Dr Caroline Meyer of Loughborough University Centre of Research into Eating Disorders.

What is the purpose of the study?

I am investigating the occurrence of unhealthy eating attitudes and behaviours among British athletes and non athletes.

Why have you been chosen?

You have been selected on the basis that you are a British non-athlete.

Do you have to take part?

It's up to you to decide whether you take part in this study. If you do decide to take part, you will be given this information sheet to keep and asked to sign a consent form. You are free to withdraw from the study at any time and do not have to give a reason. A decision not to take part or to withdraw at any time will not penalise you.

What will happen to you if you choose to take part? What will you have to do?

If you are over 18, you will first complete the **informed consent form** and then complete the enclosed questionnaire pack, which aims to assess your weight, diet and eating behaviours. The completion of the questionnaire should not take longer than 15 minutes. Once completed, please return the questionnaires to the researcher in the sealed envelope.

If you are under 18: what do you do?

If you decide to take part in the study, first you will need parental consent. Please get one of your parents to sign the **parental consent form** to say that they give permission for you to participate in the study, but also complete the **willingness to participate form** yourself as well. Once this is done, then complete the questionnaire pack.

What are the possible disadvantages of taking part?

By taking part in this investigation, you will have the opportunity to open up and reveal personal issues that may have a negative effect on you and you may experience unhappiness. However, be assured that the research is anonymous, confidential and voluntary and help will be offered, should you feel you need it.

What are the possible benefits of taking part?

I hope that participating in this study will be beneficial for you, as it is likely to act as a way to reflect on issues that may (or not) have concerned you recently. Please note that advice on gaining help will be offered if requested.

What happens when the research study ends?

Should you feel that you need advice or help, I am more than happy to recommend you suitable services. Additionally, if you would like to know the results of the research, I will be happy to send you a report of the findings, but please note that I will not be able to offer specific details pertaining to yourself.

What if something goes wrong?

No special compensation arrangements are in place in the extreme unlikely case that taking part in this research results in any negative effects for you. However, if you wish to discuss or complain about any aspect of the study, such as the way you have been approached or treated during the course of this study, please contact **Dr Sophia Jowett** (s.jowett@lboro.ac.uk) or **Dr Caroline Meyer** (c.meyer@lboro.ac.uk). Additionally the University has a policy relating to Research Misconduct and Whistle Blowing which is available online at [http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing\(2\).htm](http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm).

What will happen to the results of the research study?

The results will be published as part of a PhD thesis and it is anticipated that the findings will be published in a sports or medical journal. You will be notified of how to obtain results once the study is completed (if requested). The results may also be presented at conferences. In all instances, no names or any other identifying features of participants will appear.

Who has reviewed the study?

The study has been subject to review by experts in the field and ethical approval has been granted by Loughborough University.

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Dr Caroline Meyer

Tel:01509228450

01509 226331

01509 223032

Email: v.shanmugam@lboro.ac.uk

S.jowett@lboro.ac.uk

C.meyer@lboro.ac.uk

Should you agree to take part in this study, you will be given this information sheet to keep, together with a copy of your signed consent form upon request.

Thank you for taking the time to consider participation in this study.

Appendix 3

Participant Information Sheet: study 1, 2, 4, & 5- athlete



Relationships and Eating Behaviours among British Sports: A Longitudinal Study

Participant Information Sheet

You are being invited to participate in this research study, which is part of a PhD study at Loughborough University. Before you decide, it is important for you to understand why the research is being conducted and what it will entail. Please take the time to read the following information carefully and ask me if there is anything that you do not understand or that is not clear or if you require more information.

Thank you for reading this.

Who is doing this research?

This research is being conducted by Vaithehy Shanmugam, under the joint supervision of Dr Sophia Jowett of the School of Sport and Exercise Sciences and Dr Caroline Meyer of Loughborough University Centre of Research into Eating Disorders.

What is the purpose of the study?

I am investigating the occurrence of unhealthy eating behaviours within UK sport and whether the interpersonal relationships formed within and outside the athletic setting are associated to such behaviours.

Why have you been chosen?

You have been selected on the basis that you are a British athlete participating at either the elite, developmental or recreational level.

Do you have to take part?

It's up to you to decide whether you take part in this study. If you do decide to take part, you will be given this information sheet to keep and asked to sign a consent form. You are free to withdraw from the study at any time and do not have to give a reason. A decision not to take part or to withdraw at any time will not penalise you.

What will happen to you if you choose to take part? What will you have to do?

If you are over 18, you will first complete the **informed consent form** and then complete the enclosed questionnaire pack, which aims to assess the quality of the relationships you maintain with your parents, coaches and team-mates along with your thoughts and behaviours toward food and weight. The levels self esteem, perfectionism and depression will also be assessed. The completion of the questionnaire should not take longer than 25 minutes. Once completed, please return the questionnaires to the researcher. After this initial stage, you will be asked to complete similar questionnaires at additional time points in the following 18 month period, this will be done electronically.

If you are under 18: what do you do? If you decide to take part in the study, first you will need parental consent. Please get one of your parents to sign the **parental consent form** to say that they give permission for you to participate in the study, but also complete the **willingness to participate form** yourself as well. Once this is done, then complete the questionnaire pack.

What are the possible disadvantages of taking part?

By taking part in this investigation, you will have the opportunity to open up and reveal personal issues that may have a negative effect on you and you may experience unhappiness. However, be assured that the research is anonymous, confidential and voluntary and help will be offered, should you feel you need it.

What are the possible benefits of taking part?

I hope that participating in this study will be beneficial for you, as it is likely to act as a way to reflect on issues that may (or not) have concerned you recently (i.e. eating or relationship concerns). Please note that advice on gaining help will be offered if requested.

What happens when the research study ends?

Should you feel that you need advice or help, I am more than happy to recommend you suitable services. Additionally, if you would like to know the results of the research, I will be happy to send you a report of the findings, but please note that I will not be able to offer specific details pertaining to yourself.

What if something goes wrong?

No special compensation arrangements are in place in the extreme unlikely case that taking part in this research results in any negative effects for you. However, if you wish to discuss or complain about any aspect of the study, such as the way you have been approached or treated during the course of this study, please contact **Dr Sophia Jowett** (s.jowett@lboro.ac.uk) or **Dr Caroline Meyer** (c.meyer@lboro.ac.uk). Additionally the University has a policy relating to Research Misconduct and Whistle Blowing which is available online at [http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing\(2\).htm](http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm).

What will happen to the results of the research study?

The results will be published as part of a PhD thesis and it is anticipated that the findings will be published in a sports or medical journal. You will be notified of how to obtain results once the study is completed (if requested). The results may also be presented at conferences. In all instances, no names or any other identifying features of participants will appear.

Who has reviewed the study?

The study has been subject to review by experts in the field and ethical approval has been granted by Loughborough University.

Contact for further information

If you have any further questions, please contact:

Vaithehy Shanmugam

Dr Sophia Jowett

Dr Caroline Meyer

Tel: 01509228450

01509 226331

01509 223032

Email: v.shanmugam@lboro.ac.uk

S.jowett@lboro.ac.uk

C.meyer@lboro.ac.uk

Should you agree to take part in this study, you will be given this information sheet to keep, together with a copy of your signed consent form upon request.

Thank you for taking the time to consider participation in this study.

Appendix 4

Participant Information Sheet: study 3- Athletes



Loughborough University
Centre for Research into Eating Disorders

Interpersonal Difficulties and Eating Psychopathology

Participant Information Sheet

You are being invited to participate in this research study, which is part of a PhD study at Loughborough University. Before you decide, it is important for you to understand why the research is being conducted and what it will entail. Please take the time to read the following information carefully and ask me if there is anything that you do not understand or that is not clear or if you require more information.

Thank you for reading this.

Who is doing this research?

This research is being conducted by Vaithehy Shanmugam, under the joint supervision of Dr Sophia Jowett of the School of Sport, Exercise and Health Sciences and Dr Caroline Meyer of Loughborough University Centre of Research into Eating Disorders.

What is the purpose of the study?

We are investigating the occurrence of unhealthy eating behaviours amongst athletes and non-athletes and whether difficulties in social interactions are associated to such unhealthy eating behaviours.

Why have you been chosen?

You have been selected on the basis that you are a British athlete currently competing in sports at either the elite, developmental or recreational level.

Do you have to take part?

It's up to you to decide whether you take part in this study. If you do decide to take part, you will be given this information sheet to keep and asked to sign a consent form. You are free to withdraw from the study at any time and do not have to give a reason. A decision not to take part or to withdraw at any time will not penalise you.

What will happen to you if you choose to take part? What will you have to do?

You will first complete the **informed consent form** and then complete the enclosed questionnaire pack, which aims to assess the quality of the relationships you maintain with your parents and coaches, how you generally interact with others in social settings, your thoughts and behaviours towards eating, shape and weight. Levels of self-esteem, perfectionism and depression will also be assessed. The completion of the questionnaire should not take longer than 25 minutes. Once completed, please return the questionnaires to the researcher.

What are the possible disadvantages of taking part?

By taking part in this investigation, you will have the opportunity to open up and reveal personal issues that may have a negative effect on you and you may experience unhappiness. However, be assured that the research is anonymous, confidential and voluntary and help will be offered, should you feel you need it.

What are the possible benefits of taking part?

I hope that participating in this study will be beneficial for you, as it is likely to act as a way to reflect on issues that may (or not) have concerned you recently (i.e. eating or relationship concerns). Please note that advice on gaining help will be offered if requested.

What happens when the research study ends?

Should you feel that you need advice or help, I am more than happy to recommend you suitable services. Additionally, if you would like to know the results of the research, I will be happy to send you a report of the findings, but please note that I will not be able to offer specific details pertaining to yourself.

What if something goes wrong?

No special compensation arrangements are in place in the extreme unlikely case that taking part in this research results in any negative effects for you. However, if you wish to discuss or complain about any aspect of the study, such as the way you have been approached or treated during the course of this study, please contact **Dr Sophia Jowett** (s.jowett@lboro.ac.uk) or **Dr Caroline Meyer** (c.meyer@lboro.ac.uk). Additionally the University has a policy relating to Research Misconduct and Whistle Blowing which is available online at [http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing\(2\).htm](http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm).

What will happen to the results of the research study?

The results will be published as part of a PhD thesis and it is anticipated that the findings will be published in a sports or medical journal. You will be notified of how to obtain results once the study is completed (if requested). The results may also be presented at conferences. In all instances, no names or any other identifying features of participants will appear.

Who has reviewed the study?

The study has been subject to review by experts in the field and ethical approval has been granted by Loughborough University.

Contact for further information

If you have any further questions, please contact:

Vaithehy Shanmugam

Dr Sophia Jowett

Dr Caroline Meyer

Tel: 01509228450

01509 226331

01509 223032

Email: v.shanmugam@lboro.ac.uk

S.jowett@lboro.ac.uk

C.meyer@lboro.ac.uk

Should you agree to take part in this study, you will be given this information sheet to keep, together with a copy of your signed consent form upon request.

Thank you for taking the time to consider participation in this study

Appendix 5

Participant Information Sheet: study 3- Non-athletes



Loughborough University
Centre for Research into Eating Disorders

Interpersonal Difficulties and Eating Psychopathology

Participant Information Sheet

You are being invited to participate in this research study, which is part of a PhD study at Loughborough University. Before you decide, it is important for you to understand why the research is being conducted and what it will entail. Please take the time to read the following information carefully and ask me if there is anything that you do not understand or that is not clear or if you require more information.

Thank you for reading this.

Who is doing this research?

This research is being conducted by Vaithehy Shanmugam, under the joint supervision of Dr Sophia Jowett of the School of Sport, Exercise and Health Sciences and Dr Caroline Meyer of Loughborough University Centre of Research into Eating Disorders.

What is the purpose of the study?

We are investigating the occurrence of unhealthy eating behaviours amongst athletes and non-athletes and whether difficulties in social interactions are associated to such unhealthy eating behaviours.

Why have you been chosen?

You have been selected on the basis that you are a British non-athlete engaged in no organised sport.

Do you have to take part?

It's up to you to decide whether you take part in this study. If you do decide to take part, you will be given this information sheet to keep and asked to sign a consent form. You are free to withdraw from the study at any time and do not have to give a reason. A decision not to take part or to withdraw at any time will not penalise you.

What will happen to you if you choose to take part? What will you have to do?

You will first complete the **informed consent form** and then complete the enclosed questionnaire pack, which aims to assess the quality of the relationships you maintain with your parents, how you generally interact with others in social settings, along with your thoughts and behaviours towards eating, shape and weight. Levels of self-esteem, perfectionism and mood will also be assessed. The completion of the questionnaire should not take longer than 20 minutes. Once completed, please return the questionnaires to the researcher.

What are the possible disadvantages of taking part?

By taking part in this investigation, you will have the opportunity to open up and reveal personal issues that may have a negative effect on you and you may experience unhappiness. However, be assured that the research is anonymous, confidential and voluntary and help will be offered, should you feel you need it.

What are the possible benefits of taking part?

I hope that participating in this study will be beneficial for you, as it is likely to act as a way to reflect on issues that may (or not) have concerned you recently (i.e. eating or relationship concerns). Please note that advice on gaining help will be offered if requested.

What happens when the research study ends?

Should you feel that you need advice or help, I am more than happy to recommend you suitable services. Additionally, if you would like to know the results of the research, I will be happy to send you a report of the findings, but please note that I will not be able to offer specific details pertaining to yourself.

What if something goes wrong?

No special compensation arrangements are in place in the extreme unlikely case that taking part in this research results in any negative effects for you. However, if you wish to discuss or complain about any aspect of the study, such as the way you have been approached or treated during the course of this study, please contact **Dr Sophia Jowett** (s.jowett@lboro.ac.uk) or **Dr Caroline Meyer** (c.meyer@lboro.ac.uk). Additionally the University has a policy relating to Research Misconduct and Whistle Blowing which is available online at [http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing\(2\).htm](http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm).

What will happen to the results of the research study?

The results will be published as part of a PhD thesis and it is anticipated that the findings will be published in a sports or medical journal. You will be notified of how to obtain results once the study is completed (if requested). The results may also be presented at conferences. In all instances, no names or any other identifying features of participants will appear.

Who has reviewed the study?

The study has been subject to review by experts in the field and ethical approval has been granted by Loughborough University.

Contact for further information

If you have any further questions, please contact:

Vaithehy Shanmugam	Dr Sophia Jowett	Dr Caroline Meyer
Tel: 01509228450	01509 226331	01509 223032
Email: v.shanmugam@lboro.ac.uk	S.jowett@lboro.ac.uk	C.meyer@lboro.ac.uk

Should you agree to take part in this study, you will be given this information sheet to keep, together with a copy of your signed consent form upon request.

Thank you for taking the time to consider participation in this study.

Appendix 6

Generic Personal Consent Form – Athletes and non-athletes



Loughborough University
Centre for Research into Eating Disorders

INFORMED CONSENT FORM

(to be completed after Participant Information Sheet has been read)

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in the study.

I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.

I understand that all the information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others.

I agree to participate in this study.

Your name:.....

Your signature:.....

Signature of investigator:.....

Date:.....

Appendix 7

Generic Parental Consent Form – for under 18 year old athletes' parents



Loughborough University
Centre for Research into Eating Disorders

PARENTAL INFORMED CONSENT FORM

(to be completed by parents of those under 18 years of age, after Participant Information Sheet has been read)

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my child's participation.

I understand that my child is under no obligation to take part in the study.

I understand that my child has the right to withdraw from this study at any stage for any reason, and that she/ he will not be required to explain the reasons for withdrawing.

I understand that all the information that my child provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others.

I agree to allow my child to participate in this study.

Your name:.....

Your signature:.....

Signature of investigator:.....

Date:.....

Appendix 8

Willingness to Participate Form: under 18 year old athletes



WILLINGNESS TO PARTICIPATE

(to be completed by those aged under 18, after reading the participant information sheet)

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in the study.

I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.

I understand that all the information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others.

I agree to participate in this study.

Your name:.....

Your signature:.....

Signature of investigator:

Date:.....

Appendix 9

Demographic Questionnaire: study 1, 2, & 5- Athletes

Please complete the information below:

- 1. Your initials:
- 2. Your email address:.....
- 3. Your age:
- 4. Your gender: *M* *F*
- 5. Please specify your Nationality.....

6. Please specify your ethnicity:

- | | | | | | |
|--|--------------------------|--|--------------------------|-----------------------------------|--------------------------|
| <i>White –English</i> | <input type="checkbox"/> | <i>White- Scottish</i> | <input type="checkbox"/> | <i>White- Welsh</i> | <input type="checkbox"/> |
| <i>Black Caribbean</i> | <input type="checkbox"/> | <i>Black African</i> | <input type="checkbox"/> | <i>Asian Indian</i> | <input type="checkbox"/> |
| <i>Asian Pakistani</i> | <input type="checkbox"/> | <i>Asian Bangladeshi</i> | <input type="checkbox"/> | <i>Asian Chinese</i> | <input type="checkbox"/> |
| <i>Mixed race- White and Black Caribbean</i> | <input type="checkbox"/> | <i>Mixed race- white and black African</i> | <input type="checkbox"/> | <i>Mixed race white and Asian</i> | <input type="checkbox"/> |
| <i>Other ethnicity (please specify)</i> | <input type="checkbox"/> | | | | |
| | | | | | |

7. Please specify the sport /event you participate in (*most regularly*):
.....

7a. Please specify if you compete in any other sports at the same level:
.....

8. Are you currently on season or off season: *On-season* *Off-season*

9. Are you currently injured: *Yes* *No*
If yes, please specify
.....

10. How long have you been participating in this sport:.....*years**months*

11. Do you plan to stop participating in this sport in the next 18 months: *Yes* *No*

12. How many hours do you train per week:.....

13. What is your performance level: (*select your highest standard*)

- Recreational** **University (2nd team and below)** **Club**
County/Regional **University (1st team)** **National**
International **Other (please specify)**

Your principal coach's and team mate's details: You will be referring to them in subsequent sections.

14. Your coach's gender: **M** **F**
 14a. How long have you been training with your current coach:.....**years****months**
 14b. How many hours do you spend training with your current coach:.....
 14c. Your closest team mate's gender within your team or squad: **M** **F**
 14d. How many hours per week do you train with your closest team mate:.....
 14e. How long have you been training with your closest team mate:**years****months**

Section A: This section aims to assess your weight and diet history

1. What has been your lowest weight in the last 12 months:.....
2. What has been your highest weight in the last 12 months:.....
3. What is your desired weight:.....
4. What is the recognised/ ideal weight for your sport:.....
5. Have you tried to **lose** weight in the last 12 months: **Yes** **No**
- 5a. If so, what strategies have you tried:
6. Have you tried to **gain** weight in the last 12 months: **Yes** **No**
- 6a. If so, what strategies have you tried:.....
7. How many times have you dieted over your athletic career:.....
8. Have you previously suffered from an eating disorder: **Yes** **No**
9. Do you currently suffer from an eating disorder: **Yes** **No**
10. Are you in treatment for an eating disorder: **Yes** **No**
11. Do you have regular contact with a nutritionist: **Yes** **No**

12. Over the last 12 months, has there been any medical conditions that have interrupted your training schedule:

Yes No *If yes, please specify:*

Females only:

13. Are you currently pregnant:

Yes

No

Appendix 10

Demographic Questionnaire: study I- Non-athletes

Please complete the information below:

1. Your age :.....

2. Your gender: M F

3. Please specify your Nationality:

4. Please specify your ethnicity:

White –English White- Scottish White- Welsh

Black Caribbean Black African Asian Indian

Asian Pakistani Asian Bangladeshi Asian Chinese

Mixed race- White and Black Mixed race- white and Mixed race white and
Caribbean black African Asian

Other ethnicity (please specify)
.....

5a. Do you participate in any sport: Yes No

If yes, please specify:

.....

5b. Please specify if you attend the gym: Yes No

If yes, please specify hours per week

6a. Are you currently seeking treatment for any illness: Yes No

If yes, please specify

6b. Are you currently seeking treatment for any mental health problems: Yes No

If yes, please specify

Section A: This section aims to assess your weight and diet history

1. What has been your lowest weight in the last 12 months:.....

2. What has been your highest weight in the last 12 months:.....

3. What is your desired weight:.....

Appendix 11

Demographic Questionnaire: study 3- Athletes

1. Your age:.....

2. Your gender: *M* *F*

3. Please specify your Nationality:.....

4. Please specify your ethnicity:

- | | | | | | |
|--|--------------------------|--|--------------------------|-------------------------------------|--------------------------|
| <i>White –English</i> | <input type="checkbox"/> | <i>White- Scottish</i> | <input type="checkbox"/> | <i>White- Welsh</i> | <input type="checkbox"/> |
| <i>White-other</i> | <input type="checkbox"/> | <i>Black Caribbean</i> | <input type="checkbox"/> | <i>Black African</i> | <input type="checkbox"/> |
| <i>Black other (please specify)</i> | <input type="checkbox"/> | <i>Asian Indian</i> | <input type="checkbox"/> | <i>Asian Pakistani</i> | <input type="checkbox"/> |
| <i>Asian Bangladeshi</i> | <input type="checkbox"/> | <i>Asian Chinese</i> | <input type="checkbox"/> | <i>Asian Other (please specify)</i> | <input type="checkbox"/> |
| <i>Mixed race- White and Black Caribbean</i> | <input type="checkbox"/> | <i>Mixed race- white and black African</i> | <input type="checkbox"/> | <i>Mixed race white and Asian</i> | <input type="checkbox"/> |
| <i>Mixed race Other (please specify)</i> | <input type="checkbox"/> | <i>Other</i> | | | |
| | | | | | |

5. Please specify the sport you participate in (*most regularly*):.....

5a. Please specify if you compete in any other sports at the same level:.....

6. Are you currently on season or off season: *On-season* *Off-season*

7. Are you currently injured: *Yes* *No*
If yes, please specify

8. Are you currently seeking treatment for any medical or mental health issues:
Yes *No* *If yes, please specify*

9. How long have you been participating in this sport:.....*years**months*

10. How many hours do you train per week:.....

11. What is your performance level: (*select your highest standard*)

- | | | |
|--|--|--|
| <i>University (3rd team and below)</i> <input type="checkbox"/> | <i>University 2nd team</i> <input type="checkbox"/> | <i>University 1st team</i> <input type="checkbox"/> |
| <i>Regional</i> <input type="checkbox"/> | <i>County</i> <input type="checkbox"/> | <i>Club</i> <input type="checkbox"/> |
| <i>National</i> <input type="checkbox"/> | <i>International</i> <input type="checkbox"/> | <i>Recreational</i> <input type="checkbox"/> |

Other *Please specify:.....*

Your principal coach's details: You will be referring to them in subsequent sections.

12a. Your coach's gender: *M* *F*

12b. How long have you been training with your current coach*years* *months*

12c. How many hours do you spend training with your current coach.....

Females only:

13. Are you currently pregnant: Yes No

Appendix 12

Demographic Questionnaire: study 3- Non-athletes

1. Your age:.....
2. Your gender: *M* *F*
3. Please specify your Nationality:.....
4. Please specify your ethnicity:
- | | | | | | |
|--|--------------------------|--|--------------------------|-------------------------------------|--------------------------|
| <i>White –English</i> | <input type="checkbox"/> | <i>White- Scottish</i> | <input type="checkbox"/> | <i>White- Welsh</i> | <input type="checkbox"/> |
| <i>White-other</i> | <input type="checkbox"/> | <i>Black Caribbean</i> | <input type="checkbox"/> | <i>Black African</i> | <input type="checkbox"/> |
| <i>Black other (please specify)</i> | <input type="checkbox"/> | <i>Asian Indian</i> | <input type="checkbox"/> | <i>Asian Pakistani</i> | <input type="checkbox"/> |
| <i>Asian Bangladeshi</i> | <input type="checkbox"/> | <i>Asian Chinese</i> | <input type="checkbox"/> | <i>Asian Other (please specify)</i> | <input type="checkbox"/> |
| <i>Mixed race- White and Black Caribbean</i> | <input type="checkbox"/> | <i>Mixed race- white and black African</i> | <input type="checkbox"/> | <i>Mixed race white and Asian</i> | <input type="checkbox"/> |
| <i>Mixed race Other (please specify)</i> | <input type="checkbox"/> | <i>Other</i> | | | |
| | | | | | |
5. Do you engage in organised sport? *Yes* *No*
- 5a. If yes, please specify sport and level of participation :.....
- 5b. How long have you been participating in this sport:.....*years**months*
- 5c. How many hours per week do you train:.....*hours*
6. Do you attend the gym?: *Yes* *No*
- 6a. If yes, please specify how many hours :.....
7. Are you currently seeking treatment for any medical or mental health issues:
Yes *No*
If yes, please specify
-

Females only:

8. **Are you currently pregnant:** *Yes* *No*
-

Appendix 13

EDE-Q 6.0

This section contains questions relating to your thoughts and behaviour towards body-weight and shape in *the PAST FOUR WEEKS ONLY (28 days)*. Please read each question carefully and tick the appropriate response on the right. Please answer all the questions.

What is your weight at present? (please give your best estimate.).....

What is your height? (please give your best estimate.).....

If female: Over the past three to four months, have you missed any menstrual periods? Yes No

If so, how many?.....

Have you been taking the pill? Yes No

On how many days out of the past 28 days....	No days	1-5 days	6-12 days	13- 15 days	16- 22 days	23-27 days	Every day
Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (<i>whether or not you have succeeded</i>)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you gone for long periods of time (<i>8 waking hours or more</i>) without eating anything at all in order to influence your shape or weight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (<i>whether or not you have succeeded</i>)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you tried to follow definite rules regarding your eating (<i>for example, a calorie limit</i>) in order to influence your shape or weight (<i>whether or not you have succeeded</i>)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you had a definite desire to have a totally flat stomach?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in (<i>for example, working, following a conversation, or reading</i>)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

On how many days out of the past 28 days....	No days	1-5 days	6-12 days	13- 15 days	16- 22 days	23-27 days	Every day
Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (<i>for example, working, following a conversation, or reading</i>)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you had a definite fear of losing control over eating?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you had a definite fear that you might gain weight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you felt fat?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have you had a strong desire to lose weight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please fill in the appropriate number in the space below. Remember that the questions refer to the past four weeks (28 days)

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)?

.....

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)?

.....

Over the past 28 days, on how many **DAYS** have such episode of overeating occurred (i.e., have you eaten an unusually large amount of food **and** have had a sense of loss of control at the time)?

.....

Over the past 28 days, how many **times** have you made yourself sick (vomit) as a means of controlling your shape or weight?

.....

Over the past 28 days, how many **times** have you taken laxatives as a means of controlling your shape or weight?

.....

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?

.....

Please tick the appropriate response. Please note that for these questions, the term 'binge eating' means what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
Over the past 28 days, on how many days have you eaten in secret (i.e. furtively)? Do not count episodes of binge eating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	None of the times	A few of the times	Less than half	Half of the times	More than half	Most of the time	Every time
On what proportion of the times that you have eaten have you felt guilty (felt that you have done wrong) because of its effect on your shape or weight)? Do not count episodes of binge eating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Not at all	Slightly	Moderately	Markedly
Over the past 28 days, how concerned have you been about other people seeing you eat? Do not count episodes of binge eating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has your weight influenced how you think about (<i>judge</i>) yourself as a person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has your shape influenced how you think about (<i>judge</i>) yourself as a person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How dissatisfied have you been with your weight ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How dissatisfied have you been with your shape ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How uncomfortable have you felt seeing your body (<i>for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower</i>)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How uncomfortable have you felt about others seeing your shape or figure (<i>for example, in communal changing rooms, when swimming or wearing tight clothes</i>)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 14

S-SQRI - parents

This section contains questions concerning your relationship with the parent that has had the most significant impact on your sporting career.

Please specify the parent that you will be referring to in the following questionnaire: **Mother** **Father**

Please respond as honestly as you can, by the degree to which each statement is true or not true for you, in regards to your relationship with your parent.

	Not at all	A little	Quite a bit	Very Much
To what extent could you turn to your parent for advice about problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you need to work hard to avoid conflict with your parent?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent could you count on your parent for help with a problem?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How upset does your parent sometimes make you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you count on your parent to help you if, <i>for example, a family member very close to you died?</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you wanted to do something different in a training session (<i>something that would affect your participation or performance</i>), how confident are you that your parent would be willing to do something with you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you count on your parent to listen to you when you are very angry at someone else?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How much would you like your parent to change?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How angry does your parent make you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How much do you argue with your parent?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often does your parent make you feel angry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you really count on your parent to distract you from your worries when you feel under stress?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 15

S-SQRI- Coaches

Section D: This section contains questions relating to your relationship with your current coach. *Please respond as honestly as you can, by the degree to which each statement is true or not true for you, with regards to your relationship with your coach.*

	Not at all	A little	Quite a bit	Very Much
To what extent could you turn to your coach for advice about problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you need to work hard to avoid conflict with your coach?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent could you count on your coach for help with a problem?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How upset does your coach sometimes make you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you count on your coach to help you if <i>for example a family member very close to you died</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you wanted to do something different in a training session (<i>something that would affect your participation or performance</i>), how confident are you that your coach would be willing to do something with you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you count on your coach to listen to you when you are very angry at someone else?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How much would you like your coach to change?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How angry does your coach make you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How much do you argue with your coach?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often does your coach make you feel angry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you really count on your coach to distract you from your worries when you feel under stress?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 16

S-SQRI -Teammates

This section contains questions relating to your relationship with your closest team mate on your team/ squad.
Please respond as honestly as you can, by the degree to which each statement is true or not true for you, with regards to your relationship with your closest team-mate.

	Not at all	A little	Quite a bit	Very Much
To what extent could you turn to your team-mate for advice about problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you need to work hard to avoid conflict with your team-mate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent could you count on your team-mate for help with a problem?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How upset does your team-mate sometimes make you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you count on your team-mate to help you if <i>for example a family member very close to you died</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you wanted to do something different in a training session (<i>something that would affect your participation or performance</i>), how confident are you that your team-mate would be willing to do something with you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you count on your team-mate to listen to you when you are very angry at someone else?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How much would you like your team-mate to change?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How angry does your team-mate make you feel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How much do you argue with your team-mate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often does your team-mate make you feel angry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To what extent can you really count on your team-mate to distract you from your worries when you feel under stress?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 17

POPS; the college-student version – athlete Mother

This section contains questions concerning your relationship with your MOTHER.

Please specify whether your MOTHER has had the most significant impact on your sporting career.

YES **NO**

Please respond as honestly as you can, by the degree to which each statement is true or not true for you, in regards to your interactions with your MOTHER.

	Not at all true			Somewhat true			Very true
My mother seems to know how I feel about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother tries to tell me how to run my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother, whenever possible, allows me to choose what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother listens to my opinion or perspective when I've got a problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother allows me to decide things for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother insists upon my doing things her way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother is usually willing to consider things from my point of view.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother helps me to choose my own direction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother isn't very sensitive to many of my needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother finds time to talk with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother doesn't seem to think of me often.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother spends a lot of time with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother often seems too busy to attend to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother is not very involved with my concerns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother puts time and energy into helping me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 18

POPS; the college-student version – non-athlete Mother

This section contains questions concerning your relationship with your MOTHER.

Please specify whether your MOTHER has had the most significant impact and involvement in your life.

YES **NO**

Please respond as honestly as you can, by the degree to which each statement is true or not true for you, in regards to your interactions with your MOTHER.

	Not at all true			Somewhat true			Very true
My mother seems to know how I feel about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother tries to tell me how to run my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother, whenever possible, allows me to choose what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother listens to my opinion or perspective when I've got a problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother allows me to decide things for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother insists upon my doing things her way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother is usually willing to consider things from my point of view.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother helps me to choose my own direction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother isn't very sensitive to many of my needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother finds time to talk with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother doesn't seem to think of me often.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother spends a lot of time with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother often seems too busy to attend to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother is not very involved with my concerns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My mother puts time and energy into helping me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 19

POPS; the college-student version –athlete Father

This section contains questions relating to your relationship with your FATHER

Please specify whether your FATHER has had the most significant impact on your sporting career.

YES NO

Please respond as honestly as you can, by the degree to which each statement is true or not true for you, in regards to your interactions with your FATHER.

	Not at all true			Some what true			Very true
My father seems to know how I feel about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father tries to tell me how to run my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father, whenever possible, allows me to choose what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father listens to my opinion or perspective when I've got a problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father allows me to decide things for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father insists upon my doing things his way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father is usually willing to consider things from my point of view.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father helps me to choose my own direction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father isn't very sensitive to many of my needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father finds time to talk with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father doesn't seem to think of me often.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father spends a lot of time with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father often seems too busy to attend to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father is not very involved with my concerns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father puts time and energy into helping me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 20

POPS; the college-student version –non-athlete Father

This section contains questions relating to your relationship with your FATHER

Please specify whether your FATHER has had the most significant impact and involvement in your life

YES NO

Please respond as honestly as you can, by the degree to which each statement is true or not true for you, in regards to your interactions with your FATHER.

	Not at all true			Some what true			Very true
My father seems to know how I feel about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father tries to tell me how to run my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father, whenever possible, allows me to choose what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father listens to my opinion or perspective when I've got a problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father allows me to decide things for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father insists upon my doing things his way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father is usually willing to consider things from my point of view.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father helps me to choose my own direction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father isn't very sensitive to many of my needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father finds time to talk with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father doesn't seem to think of me often.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father spends a lot of time with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father often seems too busy to attend to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father is not very involved with my concerns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My father puts time and energy into helping me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 21

POPS: the college-student version - Coach

This section contains questions relating to your relationship with your COACH. *Please respond as honestly as you can, by the degree to which each statement is true or not true for you, with regards to your interactions with your coach*

	Not at all true			Somewhat true			Very true
My coach seems to know how I feel about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach tries to tell me how to run my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach, whenever possible, allows me to choose what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach listens to my opinion or perspective when I've got a problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach allows me to decide things for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach insists upon my doing things his/her way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach is usually willing to consider things from my point of view.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach helps me to choose my own direction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach isn't very sensitive to many of my needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach finds time to talk with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach doesn't seem to think of me often.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach spends a lot of time with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach often seems too busy to attend to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach is not very involved with my concerns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My coach puts time and energy into helping me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 22

ECR

This section contains questions relating to how you generally feel in relationships (e.g., with your parents, friends, team-mates, coaches). *Respond to each statement by indicating how much you agree or disagree with it.*

	Disagree strongly	Disagree	Disagree slightly	Neutra I/ mixed	Agree slightly	Agree	Agree strongly
I prefer not to show others how I feel deep down.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I worry about being rejected or abandoned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am very comfortable being close to other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I worry a lot about my relationships.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Just when someone starts to get close to me, I find myself pulling away.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I worry that others won't care about me as much as I care about them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get uncomfortable when someone wants to be very close to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I worry a fair amount about losing my close relationship partners.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't feel comfortable opening up to others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often wish that close relationship partner's feelings for me were as strong as my feelings for them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I want to get close to others, but I keep pulling back.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I want to get very close to others, and this sometimes scares them away.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am nervous when another person gets too close to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I worry about being alone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel comfortable sharing my private thoughts and feelings with others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Disagree strongly	Disagree	Disagree slightly	Neutra I/ mixed	Agree slightly	Agree	Agree strongly
My desire to be very close sometimes scares people away.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I try to avoid getting too close to others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I need a lot of reassurance that close relationship partners really care about me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I find it relatively easy to get close to others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometimes I feel that I try to force others to share more feeling, more commitment to our relationship than they otherwise would.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I find it difficult to allow myself to depend on close relationship partners.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not often worry about being abandoned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I prefer not to be too close to others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I can't get a relationship partner to show interest in me, I get upset or angry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I tell my close relationship partners just about everything.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I find that my partners don't want to get as close as I would like.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I usually discuss my problems and concerns with close others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I don't have close others around, I feel somewhat anxious and insecure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel comfortable depending on others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get frustrated when my close relationship partners are not around as much as I would like.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Disagree strongly	Disagree	Disagree slightly	Neutra I/ mixed	Agree slightly	Agree	Agree strongly
I don't mind asking close others for comfort, advice or help.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get frustrated if relationship partners are not available when I need them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It helps to turn to close others in times of need.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When other people disapprove of me, I feel really bad about myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I turn to close relationship partners for many things, including comfort and reassurance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I resent it when my relationship partners spend time away from me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 23

BFNE

This section contains questions relating to how you generally behave in social interactions. *Respond to each statement by indicating how characteristic it is of you.*

	Not at all characteristic of me		Moderately characteristic of me		Extremely characteristi c of me
I worry about what other people will think of me even when I know it doesn't make any difference.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am unconcerned even if I know people are forming an unfavourable impression of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am frequently afraid of other people noticing my shortcomings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I rarely worry about what kind of impression I am making on someone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am afraid that others will not approve of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am afraid that people will find fault with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other people's opinions of me do not bother me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I am talking to someone, I worry about what they may be thinking about me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am usually worried about what kind of impression I make.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I know someone is judging me it has little effect on me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometimes I think I am too concerned with what other people think of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often worry that I will say or do the wrong things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 24

UCLA-Loneliness

This section contains questions relating to how you feel in relation to social interactions. *Respond to each statement by indicating how often you feel the way described.*

	Never	Rarely	Sometimes	Always
I lack companionship.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am no longer close to anyone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My interests and ideas are not shared by those around me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My social relations are superficial.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No one really knows me well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am unhappy being so withdrawn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People are around me but not with me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 25

FMPS- Personal Standards

This section contains questions relating to your personal standards.

Generally and including your sport, please state how you feel about the statements below...	Strongly disagree	Disagree	Neither agree or Disagree	Agree	Strongly agree
If I do not set the highest standards for myself, I am likely to end up a second rate person.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is important to me that I be thoroughly competent in everything I do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I set higher goals for myself than most people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am very good at focusing my efforts on attaining a goal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have extremely high goals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other people seem to accept lower standards from themselves than I do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I expect higher performances in my daily tasks than most people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 26

DAS- Self-Critical Perfectionism

This section contains questions relating to attitudes and beliefs that people may hold. *Respond to each statement by indicating how much you agree or disagree with the statement.*

Answer each statement according to the way you think MOST OF THE TIME	Totally disagree	Disagree very much	Disagree slightly	Neutral	Agree slightly	Agree very much	Totally Agree
It is difficult to be happy unless one is good looking, intelligent, rich and creative.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People will probably think less of me if I make a mistake.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I do not do well all the time, people will not respect me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If a person asks for help, it is a sign of weakness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I do not do as well as other people, it means I am an inferior human being.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I fail at my work, then I am a failure as a person.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you cannot do something well, there is little point in doing it at all.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If someone disagrees with me, it probably indicates he does not like me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I fail partly, it is as bad as being a complete failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If other people know what you are really like, they will think less of you.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I don't set the highest standards for myself, I am likely to end up as a second rate person.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I am to be a worthwhile person, I must be truly outstanding in at least one major respect.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
People who have good ideas are more worthy than those who do not.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I should be upset if I make a mistake.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I ask a question, it makes me look inferior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 27

RSES

This section contains questions relating to your well being. *Respond to each statement by indicating how much you agree or disagree with the statement.*

Generally and including your sport, please state how you feel about the statements below...	Strongly disagree	Disagree	Agree	Strongly agree
On the whole, I am satisfied with myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At times, I think I am no good at all.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that I have a number of good qualities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am able to do things as well as most other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel I do not have much to be proud of.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I certainly feel useless at times.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that I'm a person of worth, at least on an equal plane with others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I wish I could have more respect for myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All in all, I am inclined to feel that I am a failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I take a positive attitude toward myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 28

SCL-90R- Depression

This section contains questions relating to your mood. *Please tick the response that best describes how you have felt during the past seven (7) days.*

	<i>Not at all</i>		<i>Moderately</i>		<i>Extremely</i>
Feeling low in energy or slowed down.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crying easily.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blaming yourself for things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feelings of being trapped or caught.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling everything is an effort.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling lonely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling blue.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worrying too much about things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling no interest in things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling hopeless about the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feelings of worthlessness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thoughts of ending your life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loss of sexual interest or pleasure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

