Psychological Risk Factors for Eating Disorders in Female University Athletes

by

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ABSTRACT

The major purpose of this research was to examine self-esteem, body image, competition anxiety and coach pressure as they relate to risk factors in the development of eating disorders in female university level athletes. A secondary purpose was to look at body fat percentage and body mass index and their relationship to eating disorder symptoms. The subjects in this study were female university athletes currently participating in the sports of basketball, field hockey, swimming, soccer and rowing.

Canonical correlation analyses indicated significant relationships between restrained eating and all the risk factors. A second canonical correlation indicated a significant relationship between high body mass index and restrained eating. MANOVA analyses showed no significant differences in eating disorder symptoms among the various sport teams.

It was concluded that there are psychological predisposing factors to eating disorders in athletes but more research is needed to identify the interrelationship between the variables. Although none of the athletes in this study participated in a sport identified by previous research as having high prevalence rates of eating disorders, there were athletes showing disordered eating. It can be concluded that all athletes can be considered at risk when the predisposing factors identified in this research are present. Results are discussed in terms of preventing eating disorders in this population.

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CHAPTER 1

INTRODUCTION

Eating disorders such as anorexia nervosa (AN) and bulimia nervosa (BN) are often characterised as diseases of young, middle class white women (Thompson & Sherman, 1993). AN and BN are clinical eating disorders with diagnostic criteria outlined by the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, Third Edition-Revised (DSM-III-R). As cited in Wilmore (1991), the DSM-III-R criteria for AN as a clinical eating disorder are listed as: an intense fear of becoming fat; refusal to maintain body weight over a minimal normal weight for age and height; disturbance in the way in which one's body weight, size or shape is experienced; and in females, the absence of at least three consecutive menstrual cycles when otherwise expected to occur. Similarly, BN is a related disorder defined in the DSM-III-R by recurrent episodes of binge eating; a feeling of lack of control over eating behaviour during binges; regular self-induced vomiting; use of laxatives or diuretics; strict dieting and fasting, or vigorous exercise in order to prevent weight gain; and persistent over concern with body shape and weight.

While these are strict clinical criteria, it has been recognised that within identifiable population groups some individuals may exhibit disordered eating and distorted body image which do not necessarily meet the DSM-III-R criteria for a clinical diagnosis (Beals & Manore, 1994). It has been hypothesised that these subclinical syndromes may be more common than full clinical syndromes themselves (Shaw &

Garfinkel, 1990). One such identifiable group has been athletes, and although it has been found that athletes may be at a lower risk than members of the general population for developing a clinical eating disorder (Wilkins, Boland & Albinson, 1991), a subclinical disorder has nevertheless been documented in athletic groups and has been termed anorexia athletica (AA) (Sundgot-Borgen, 1993). It has been claimed that AA and other related eating disorders may be more pervasive than expected, particularly in specific sport classes (Beals & Manore, 1994). *

Because of the numerous physical and psychological problems associated with it, * AA is a cause of concern for athletes, coaches, and peers. Physical problems can include: fatigue, lowered immune function, anemia, lowered oxygen intake, amenorrhea, electrolyte imbalances, and lower bone density resulting in an increased incidence of stress fractures and osteoporosis (Brownell, Rodin & Wilmore, 1992). Psychological problems associated with eating disorders include depression and stress (Brownell et al., 1992), as well as perfectionism, ineffectiveness, guilt, and distrust (Lindeman, 1994).

Several psychological factors have been associated with eating disorders. Among these, low self-esteem has been shown to be common. Because of its association with heightened self-awareness, it may be a precipitating factor in the development of an eating disorder (Lindeman, 1994). The potential interaction between AN and self-esteem has importance for athletes. Typically, it has been reported that athletes show higher self-esteem and body satisfaction than nonathletes (Wilkins et al., 1991). However, because self-esteem has been identified as a possible mediator in the development of eating disorders in the general population (Lindeman, 1994), it is possible that those

athletes who possess lower self-esteem than their athletic peers may show eating disorder symptoms.

It has been stated that body-image disturbances are present in all individuals with eating disorders (Molinari, 1995). Body image has been defined as the "subjective evaluation of one's own body and the associated feelings and attitudes" (McCrea, Summerfield and Rosen, 1982). Significant differences have been found between men and women in perception of body image with women tending to overestimate their body shape (Hallinan, Pierce, Evans, DeGrenier & Andres, 1991). This same study reported that athletic participation had no effect on body image perception, with female athletes and nonathletes both idealising a thinner shape.

Specific psychological and social predisposing factors to eating disorders in athletes have not been researched extensively, although there has been some speculation. For example, Brownell et al. (1992) suggested that the competitive nature of sports may be associated with the development of eating disorders (p. 123). Another group of researchers attempted to identify risk factors for the development of eating disorders in female college-level athletes. Using structural equation modeling analysis, they found that athletes with high competition anxiety, negative social influence from coaches and peers, and negative self-appraisal of achievement showed higher eating disorder symptoms when mediated by high body image disturbances (Williamson, Netemeyer, Jackman, Anderson, Funsch & Rabalais, 1995). These findings (see fig. 1) suggest that several variables must be present for the development of an eating disorder in an athlete.

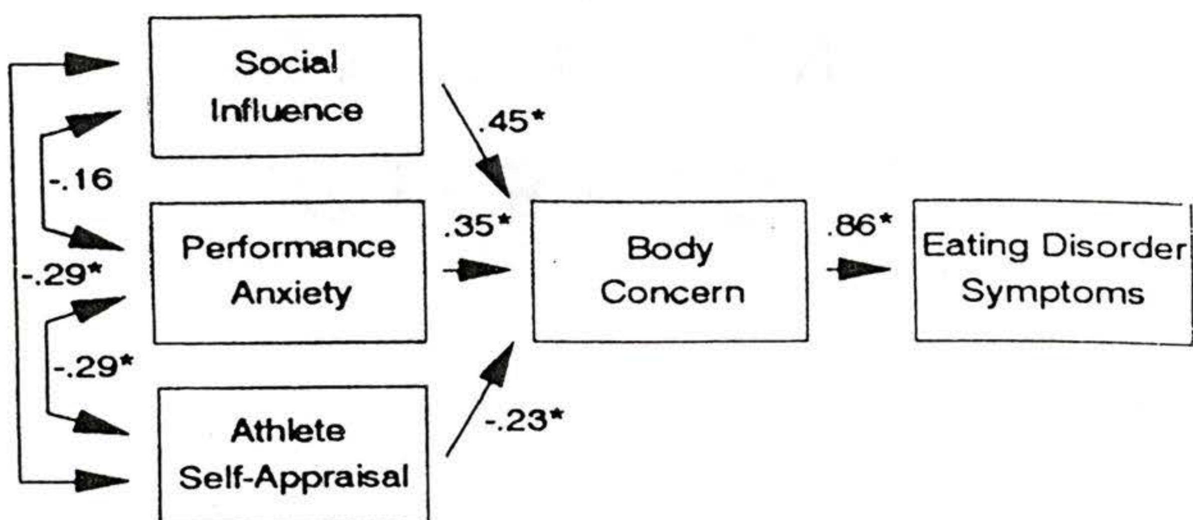

Figure 1. Results of the structural modeling analysis of the psychosocial model of risk factors for developing eating disorder symptoms in female college athletes. The variables in this model were: social influence/pressure for thinness, athletic performance anxiety, appraisal of athletic achievement, concern about body shape and size, and eating disorder symptoms. From "Structural equation modeling of risk factors for the development of eating disorder symptoms in female athletes," by D. A. Williamson, R. G. Netemeyer, L. P. Jackman, D. A. Anderson, C. L. Funsch and J. Y. Rabalais, 1995, International Journal of Eating Disorders, 17, p. 392.

The role that social factors, such as coach or peer pressure, may play in the development of an eating disorder has not been clearly identified. Williamson et al. (1995) claimed that the pressure to be thin expressed by coaches and peers was a factor in the development of an eating disorder in an athlete. In addition, the pressure on an athlete to meet weight restrictions or to conform to a certain body type could come from a number of different sources: general societal pressure; peer, trainer, and coach pressure; as well as judging criteria in certain sports (Beals & Manore, 1994). This variable needs to be examined further as a possible contributing factor to disordered eating in athletes.

Although research is needed in this area, design issues cause potential difficulties because of the nature of the problem itself. Sundgot-Borgen (1993) found that athletes tend to under-report eating disorders. One study found that eating disorder symptoms were not reported by athletes in response to a questionnaire, yet 16.4% of them exhibited characteristics of a clinical eating disorder (Wilmore, 1991). Similarly, Brownell et al. (1992) cited two studies in which none of the athletes who responded to eating disorder inventories reported eating disordered symptoms, yet some of these same athletes developed eating disorders following the study. As with all questionnaire research, the subjective nature of the testing procedure can be questioned. Shaw & Garfinkel (1990) point out that perceived loss of control is difficult to assess reliably and that the precise reporting of a binge may be difficult. What one person might consider a binge may be a normal meal to another.

From these findings, it is apparent that many questions still exist about an athlete's susceptibility to developing an eating disorder. There is a need to examine potential psychological predisposing symptoms of eating disorders which may serve as early signals for athletes at risk. For these reasons it is imperative that more research be done in this area.

Purpose of the Study

The purpose of this research was to examine selected social and psychological factors previously identified as risks in the development of eating disorders in athletes. These factors were self-esteem, competition anxiety, social pressure, and body image and their relationship to disordered eating in athletes. Because of problems associated with research in the eating disorders, a secondary purpose was to determine if there was a relationship between low body mass index or low body fat and eating disorder symptoms.

Hypotheses

The following null hypotheses were examined:

Null Hypothesis 1: That there will be no relationship between self-esteem and eating disorder symptoms.

Null Hypotheses 2: That there will be no relationship between competition anxiety and eating disorder symptoms.

Null Hypothesis 3: That there will be no relationship between body image and eating disorder symptoms.

Null Hypothesis 4: That there will be no relationship between body fat and body mass index and eating disorder symptoms.

Null Hypothesis 5: That there will be no relationship between coach and peer pressure and eating disorder symptoms.

Null Hypothesis 6: That there will be no effect of type of sport on the presence of eating disorder symptoms.

Null Hypothesis 7: That there will be no effect of sport classification (individual or team) on eating disorder symptoms.

Definition of Terms

Eating Disorder - A problem associated with eating that can range from normative concerns about body weight and shape, to rigid dieting, to subclinical and to clinical eating disorders (Wilson & Eldredge, 1992, p. 115).

Anorexia Nervosa - A clinical eating disorder characterised by intense fear of becoming fat, refusal to maintain body weight over a minimal normal weight for age and height, disturbance in the way in which one's body weight, size or shape is experienced and in females the absence of at least three consecutive menstrual cycles when otherwise expected to occur (Wilmore, 1991).

Bulimia Nervosa - A clinical eating disorder characterised by recurrent episodes of binge eating, a feeling of lack of control over eating behaviour during the eating binges, the regular engagement in self-induced vomiting, use of laxatives or diuretics,

strict dieting of fasting, or vigorous exercise in order to prevent weight gain and persistent over concern with body shape and weight (Wilmore, 1991).

Anorexia Athletica - A subclinical eating disorder present in athletes characterised by weight loss, gastrointestinal complaints, fear of becoming fat and restriction of food intake to less than 1200 kcal/day (Sundgot-Borgen, 1993).

Restrained Eating - A subscale of the Dutch Eating Behaviour Questionnaire that measures restrictive eating and dieting behaviour.

Emotional Eating - A subscale of the Dutch Eating Behaviour Questionnaire that measures eating behaviours associated with emotional reactivity.

External Eating - A subscale of the Dutch Eating Behaviour Questionnaire that measures eating behaviours associated with external factors such as proximity of food or other people eating.

Self-esteem - The extent to which a person feels positive about himself or herself (Lindeman, 1994).

Body Image - The subjective evaluation of one's own body and the associated feelings and attitudes (McCrea, Summerfield & Rosen, 1982).

Trait Competition Anxiety - A personal predisposition to perceive competition as cause for apprehension and tension (Cox, 1994).

Body Fat - The percentage of body mass that is composed of fatty tissue (Fox, Bowers & Foss, 1993).

Body Mass Index - A height to weight ratio that identifies a healthy zone with too high (overweight) or too low (underweight) a ratio being considered risky (Docherty, 1996, p.99).

CHAPTER II

RELATED LITERATURE

This chapter provides a current review of the literature on eating disorders in athletes. Topics to be discussed will include the definition of anorexia athletica, prevalence of eating disorders among athletes, the role of self-esteem in the development of an eating disorder, as well as the role competition anxiety may play in the development of eating disorders in athletes. Also discussed will be the interaction of body shape perception and eating disorders, the role coach or peer pressure may play in the development of an eating disorder, potential research problems and the role of physical measurements in eating disorder research.

2.1 DEFINITION OF ANOREXIA ATHLETICA

Generally, athletes do not meet strict DSM-III-R criteria for an eating disorder but may still exhibit a subclinical syndrome, as manifested by serious disordered eating and high concerns for body shape and weight (Beals & Manore, 1994). Subclinical syndromes are not uncommon, and as pointed out by Shaw & Garfinkel (1990), may be more prevalent than full clinical syndromes. Where this subclinical eating disorder is exhibited by athletes, it has been termed anorexia athletica (AA).

Criteria for AA diagnosis were originally outlined by Pugilese (1983), as cited in Sundgot-Borgen (1993). A more recent list of criteria was presented by Sundgot-Borgen (1993), who refined its categorisation into absolute and relative criteria. Absolute criteria are those features that are essential for an athlete to be diagnosed as having AA.

These include: weight loss, gastrointestinal complaints, no medical explanation for weight loss, excessive fear of becoming obese and restriction of food intake to less than 1200 kcal/day. The relative criteria are those that may or may not be present and include: delayed puberty, menstrual dysfunction, distorted body image, purging, bingeing and compulsive exercise. In a later paper, Sundgot-Borgen (1994a) added that athletes with AA usually report a need to lose weight because of the sport or because of instruction from a coach.

2.2 PREVALENCE OF EATING DISORDERS IN SPORT

It has been well documented that one reason for the development of eating disorders in North America is the societal emphasis on thinness as being the ideal beauty type (Rodin & Larson, 1992). Female athletes may be the closest group to embodying this physical ideal and may feel pressure to meet these expectations (Beals & Manore, 1994). As Wilkins et al. (1991) point out: "even female athletes are not immune to societal values" (p. 140). Within the athletic population however, there may be some athletes who are at greater risk for the development of an eating disorder.

It has been reported that sports with an emphasis on aesthetics, sports that emphasise a lean body build and sports with weight classes have higher incidences of participants with eating disorder symptoms. Researchers investigating high-performance athletes across Canada found that female athletes participating in weight-matched sports (lightweight rowing and judo) and athletes in sports that emphasise leanness (gymnastics and diving) had significantly higher scores on an eating disorder

inventory than athletes in nonweight-restricted sports (volleyball and heavyweight rowing) (Stoutjesdyk & Jevne, 1993). One researcher, using elite Norwegian female athletes as subjects, found that the sports with the greatest number of athletes using pathogenic weight control methods were those that were considered aesthetic, were weight dependent, or required endurance (Sundgot-Borgen, 1993). Similarly, Sundgot-Borgen (1994) found that the prevalence of eating disorders among elite female Norwegian athletes was significantly higher in aesthetic and weight dependent sports than in other sport populations. Taub and Blinde (1992) compared adolescent female athletes with nonathletes on behavioural and psychological traits associated with eating disorders as well as the use of pathogenic weight loss techniques such as vomiting and diet aids. They found that athletes showed higher perfectionism and bulimia than nonathletes, but found no differences among various sport teams. It should be recognised that such conditions are not exclusive to female athletes. For example, other researchers have shown evidence of eating disorders in male light-weight football players, with 9.9% showing binge-purge symptoms that represent an eating disorder (DePalma, Koszewski, Case, Barile, DePalma, & Oliaro, 1993).

In a study of NCAA Division 1 female athletes, it was tentatively concluded that gymnasts were at a slightly higher risk for body dissatisfaction but that cross-country runners were at slightly less risk, in comparison to other athletes competing at a university level (Warren, Stanton, & Blessing, 1990). However, in contrast to this study, Pasman & Thompson (1988) found that runners showed greater eating disturbances than controls or weight lifters and also that female runners and controls were less satisfied

than males with their bodies. There were no gender differences in body satisfaction among weight lifters. Similarly, Rosen, McKeag, Hough & Curley (1986), and Thompson & Sherman (1993) concluded that runners are at a high risk for the development of an eating disorder.

Studies have also compared the incidences of eating disorders within specific sports. One such study found a nonsignificant trend for lightweight rowers to score higher on eating disorder inventories than their heavyweight counterparts (Sykora, Grilo, Wilfley & Brownell, 1993). Athletes, however, may not be alone in showing eating disorder symptoms, nor perhaps, are they the worst population. Professional ballet dancers have been shown to have a higher risk for the development of an eating disorder than nonathletic women or adolescent dance students (Hamilton, Brooks-Gunn, & Warren, 1985).

It is evident that studies on the prevalence of eating disorders in athletes are varied. However, with a few discrepancies, most studies agree that sports with weight classes, and those that include an aesthetic component have higher numbers of athletes showing eating disorder symptoms. Some authors have also included endurance based sports as a potentially at risk group (Wilmore, 1991; Sundgot-Borgen, 1993; Sundgot-Borgen, 1994), although the precise definition of an endurance based sport may be difficult. In a study by Sundgot-Borgen (1994a) endurance sports included cross-country skiing, middle and long distance running, cycling, swimming and orienteering, but significant differences were found in eating disorder prevalence among these endurance based groups, with the skiers and runners showing higher incidences. Sundgot-Borgen

noted that different researchers have used different criteria for classification of subjects into groups; swimmers for example, have been targeted in eating disorder studies because of their concern with weight and shape, while other researchers have used swimmers because of an emphasis on leanness within the sport. He concluded that there is a need for consistency in the grouping of sports when conducting research in the area to allow for generalisation within the area.

Although most studies have found that aesthetic and weight-dependent sports show higher incidences of athletes with eating disorders, and that sports with an endurance component might also be considered as an at risk group, the evidence is inconclusive that these sports are the only ones that include athletes who are at risk for the development of an eating disorder. Research in this area should continue to look at all sporting groups and athletes for evidence of eating disorder symptomology.

2.3 POTENTIAL MEDIATING FACTORS WITH ATHLETIC EATING DISORDERS

There a number of potential mediating factors associated with eating disorders. Among athletes and in the general population self-esteem and body image are often cited as risk factors. In addition to these, athletes may be at additional risk because of competition anxiety and pressure from coaches.

2.3.1 SELF ESTEEM

Self-esteem is defined as how a person views him or herself negatively or positively and has been shown to be affected by mood, age, life-satisfaction and gender

(Lindeman, 1994). It has also been reported that exercise can enhance self-esteem (Sonstroem & Morgan, 1989; Oglesby & Hill, 1993). Despite the positive effects of exercise on self-esteem however, the relationship between self-esteem and competitive athletes is somewhat more tentative. It has been found for example, that male high school athletes scored lower on self-concept than nonathletes, but that for female high school athletes and for college level athletes of both genders, there were no differences (Pargman, 1993). These results were supported by Lindeman (1994) who, in a review paper, concluded that there are no differences in self-esteem between elite athletes and nonathletes.

The role self-esteem plays in the development and presence of eating disorders is well documented. It has been found, for example, that bulimics show lower self-esteem as well as poorer body image and greater depression, than controls (Katzman & Wolchik, 1984). Further, low self-esteem had a strong negative effect on dieting and bingeing behaviour in adolescent girls (Neumark-Sztainer, Butler, & Palti, 1996). Johnson & Connors (1987) report that bulimics show lower self-esteem than normals, and making the problem worse, bulimics tend to be sensitive to rejection. They also point out that bulimic patients have high expectations of themselves resulting in shame and guilt when they fail to live up to their views of what their ideal self should be.

Although some researchers report that self-esteem plays a role in development of eating disorders in athletes and nonathletes alike (Lindeman, 1994; Halliman, 1991), some researchers found eating-disturbed runners did not show problems with self-esteem (Parker, Lambert & Burlingame, 1994). Davis & Cowles (1989) found that strenuous

exercise may increase the possibility of eating disorders developing among female athletes in sports with an emphasis on a lean body, but their results were inconclusive as to whether it is the more emotionally vulnerable athletes who gravitate to these sports or whether it is the activity that results in lower emotional well-being. Thompson & Sherman (1993) wrote that sport could have three possible roles in affecting eating disorders: that sport can attract already at risk individuals, that participation can result in the disorder, or that sport can precipitate an eating disorder in those who are predisposed to its development. It may be then, that individuals with low self-esteem who are just starting or who are already involved in competitive sports are at risk for the development of an eating disorder particularly when you factor in the added pressures of the sports arena.

2.3.2 COMPETITION ANXIETY

Anxiety has been extensively researched for its role in athletic performance. Anxiety can be described as a state response or a trait factor of one's personality and further, state anxiety can manifest itself somatically or cognitively (Cox, 1994, p.105). A commonly held theory states that there are optimal levels of anxiety for performance with too much anxiety or too little being detrimental to performance (Cox, 1994, p. 110). However, recent researchers have proposed a three dimensional theory of anxiety and performance. This theory, known as catastrophe theory, takes into account somatic and cognitive anxiety and their interactive effects with performance (Cox, 1994, p. 122).

Most athletes are negatively affected by too much anxiety rather than too little and so arousal reduction is an often used tool in sport psychology.

Competition anxiety has been linked to self-esteem, with self-esteem being one of five factors associated with anxiety (Cox, 1994, p.105) and correlations being found between high trait anxiety and low self-esteem (Brustad, 1993, p. 707). Considering this relationship between competition anxiety and self-esteem, therefore, it can be hypothesised that competition anxiety may be a predisposing factor to anorexia athletica (Brownell, 1992). Wilson & Eldredge (1992) also speculate that competition in sport may contribute to the development of an eating disorder. They point out that the dichotomous thinking style of many athletes (i.e. winning is everything) is similar to the thinking style of some patients with eating disorders. However, competition anxiety has not been extensively researched as a potential factor in the development of eating disorders in athletes.

Among very few studies examining this question, Williamson et al. (1995) found that performance anxiety along with social influence and negative self-appraisal, when mediated by body image, were strong predictors for the development of eating disorders in athletes. The authors concluded that eating disorders among university level athletes require several risk factors, including competition anxiety, to be present at the same time resulting in disturbance in body image which in turn leads to the development of an disordered eating.

Beyond such studies, competition anxiety is rarely mentioned in eating disorder research. Because of its relationship to self-esteem, which is a strong predictor of the

risk for developing an eating disorder, and because of the significant predictive results found by Williamson et al. (1995), the role competition anxiety plays in the symptomology of eating disorders in athletes is worthy of further research.

2.3.3 BODY IMAGE

Body image is closely associated with self-esteem. For example, Marsh & Roche (1996) found that physical appearance self-concept was highly correlated with self-esteem. Other researchers concluded that individuals with high physical self-concept were free from depression and neuroticism (Sonstroem & Potts, 1996) and in a review article, the Canadian Medical Association concluded that improvement in self-esteem in exercisers was linked to enhanced body image (CMA, 1995, p. 317) .

Considering, then, the role of self-esteem in eating disorders, it is not surprising that most researchers have stated that all eating disorders involve disturbances in body image (Molinari, 1995; Cooper, Taylor, Cooper & Fairburn, 1987) and some have found that normal female subjects tend to overestimate body size (Molinari, 1995). In contrast, Cash & Green (1986) reported that normal and overweight subjects accurately estimated their body size but that underweight subjects overestimated their body width. Anorexics in the Molinari (1995) study had distorted body perception that differed across parts of the body. The size of abdominal and pelvic areas was overestimated by anorexics more than the upper torso or head. A similar study reported that body dissatisfaction focused on the size of the lower body (Bailey, Goldberg, Swap, Chomitz & Houser, 1990).

Athletes may represent a special population in their perceptions of body image. As a group, athletes typically most closely embody the societal ideal of a thin, trim build (Beals & Manore, 1994). It has been found that athletes have higher body image scores than nonathletes but that there is an inverse relationship between percent body fat and body image scores for athletes and nonathletes alike (Huddy, Nieman & Johnson, 1993; Wilkins, Boland & Albinson, 1991). Brownell et al. (1992), however, concluded 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" (p. 122).

Body image has been found to be a significant mediating variable for competition anxiety, social factors and low self-appraisal, leading to eating disorder symptoms (Williamson et al., 1995). A study by Furst & Tenebaum (1984) reported that athletes with higher anxiety also had higher body dissatisfaction. This result was explained by the nature between anxiety and subjective levels of perceived satisfaction and success. Lower anxiety was reported by those athletes who were satisfied with their activity level, regardless of the level at which they were involved. The authors suggest that future research should consider that higher level athletes may not be more satisfied with their involvement and becasue these athletes may be comparing themselves to different standards of achievement. Greater body dissatisfaction may then result.

Body image has a relationship to the etiology of eating disorders, but the exact nature of the role it may play has not yet been determined. It is evident that all persons suffering from an eating disorder will likely have a distorted perception of their own

body, but whether body image is a cause or a result of an eating disorder is still uncertain.

2.3.4 COACH AND PEER PRESSURE

The growing incidences of eating disorders in North America have been attributed to a media and societal emphasis on thinness as being physically attractive (Wilmore, 1991). Athletes are not immune to the pressures facing the general population, and may face additional pressure to maintain a certain body shape and weight from coaches and peers (Beals & Manore, 1994), as well as from influencing judges in sports such as dancing or gymnastics (Davis, Kennedy, Ravelski and Dionne, 1994).

Part of this pressure may stem from athletes believing that losing weight will aid their performance. However, although a thinner shape could be beneficial, losing too much weight will likely have a detrimental effect on performance (Beals & Manore, 1994). Factors that have been associated with eating disorders in athletes include chronic fatigue, lowered immune function, slow recovery from injury, anemia, electrolyte imbalances and osteoporosis (Beals & Manore, 1994).

Although coach and peer pressure is often mentioned in literature regarding eating disorders in sports, there are very few valid measures of this variable (Neumark-Sztainer, 1996) and the reasons for a possible relationship remain unclear. Lopiano & Zotos (1992) have speculated that because the coach athlete relationship may be one of leader and subordinate, that female athletes may be subjected to psychological pressure, particularly from male coaches. It may be that coaches who attempt to control their

athlete's behaviour may create dependencies in their athletes and these dependencies may manifest themselves as an eating disorder. Sundgot-Borgen (1994a) reported that a significant number of athletes who were dieting to improve their performance had been told by their coaches to lose weight. This same author makes the point that coaches are often key figures in an athlete's life, particularly for younger athletes, and that the athlete may feel driven to lose weight in order to meet the expectations of the coach. Further, Rosen & Hough (1988) reported that 75% of female gymnasts who were told they were overweight by their coaches began using pathogenic weight control methods. Sundgot-Borgen (1994a) however, found that eating disorders occurred only in those athletes who started on an unsupervised dieting program after being told to lose weight by their coach.

Other factors may play a role in this relationship. For example, traumatic events such as the loss of a coach have been attributed to the development of eating disorders (Sundgot-Borgen, 1994). It has also been found that pressure from coaches and peers to be thin, when mediated with a poor body image, resulted in eating disorder symptoms (Williamson et al., 1995).

Although often causally attributed to the development of eating disorders in athletes, the variable described as pressure from coaches has little empirical evidence to support its role as a factor in this area. Future research should look at this variable as a possible predictor of eating disorders in athletes, and valid measures should be developed to aid in its study.

2.4 PHYSICAL MEASUREMENTS

Physical measurements, such as body mass index (BMI), have been used to a small extent in research in the area of eating disorders. BMI is a ratio of height to weight with scores within a certain range being considered healthy. One group of researchers used BMI as their primary criteria for deciding that anorexia was not present in a group of female intramural level college athletes (Crago, Yates, Beutler & Arismedi, 1985). However, the precise relationship of BMI to eating disorder symptomology remains unclear. Davis & Cowles (1989) report that athletes in a thin body group had BMI scores in the low, underweight range, although this group also had a significantly higher number of athletes indicating they wanted to lose weight over a normal build or control group. Other researchers found no significant differences between runners, gymnasts or athletic controls on BMI, although gymnasts showed poorer body image (Warren, Stanton & Blessing, 1990). It is most likely that it is too simplistic to look at BMI alone and it is unclear whether this variable is a viable measure of determining which athletes may have an eating disorder. Physical measurements, although they may indicate that a problem is present, should not be viewed in isolation.

2.5 RESEARCH PROBLEMS

There are potential problems associated with the study of eating disorders that are inherent in the nature of the topic itself. In a paper specifically devoted to the problems of conducting research in the eating disorders, Shaw & Garfinkel (1990) discussed a number of salient points including: the reliability of subjective reports, the possibility of

associated affective disorders being present, and the difficulty in accurately defining symptoms. Several authors in the area have acknowledged the limitations of subjective questionnaires and self-report (Sundgot-Borgen, 1993; Wilmore, 1991; Stoutjesdyk & Jevne, 1993). Some researchers in developing questionnaires attempt to control for such a problem by including a "lie" scale, that should ostensibly, catch any misrepresentations. Although not including a "lie" scale, there were no significant differences beween "fake bad", "fake good" and control groups on the restraint subscale of the Dutch Eating Behaviour Questionnaire (Gorman & Allison, 1995).

Another problem in people with eating disorders is denial. As with other addictive behaviours, people with eating disorders may not believe that a problem even exists. It may also be that subjects are afraid of being found out and so reply to questionnaires in ways that ignore negative behaviour. Wilmore (1991) described this problem with athletes in stating that athletes may fear their coaches finding out about their problem and consequently losing team membership.

With researchers reporting large discrepancies between self-reported eating disorder symptoms and the actual manifestation of an eating disorder (Sundgot-Borgen, 1993), it is important that the possibility of under-reporting or misrepresentation of symptomology be taken into account in any study of the area.

CHAPTER III

RESEARCH METHODS

This chapter outlines the research methodology that was used in this study. Topics to be discussed are the nature and selection of the subjects, procedures, variables, limitations, instrumentation and statistical analyses.

3.1 SUBJECTS

Subjects were 46 female University of Victoria varsity athletes competing in the 1996 - '97 athletic season who volunteered to participate in this study. The subject's age ranged from 17 to 24 years (x=19.85 yrs.) and represented the sports of field hockey (n=8), swimming (n=8), soccer (n=10), rowing (n=8) and basketball (n=12) .

All subjects were advised of the purpose of the study and signed an informed consent stating they understood the conditions of the study and that they were free to withdraw at any time. The basketball players also signed a form allowing the researcher to use body fat, height and weight data collected as part of a concurrent study at the University of Victoria.

3.2 PROCEDURES

All subjects were weighed and measured at the University of Victoria's fitness testing centre by students enrolled in a fitness appraisal course needing practical work in order to complete course requirements. Height and weight were taken in order to determine subject's body mass index (BMI). During the same testing session, skin fold

measurements were taken at the bicep, tricep, suprailiac and subscapular sites. Percent body fat was calculated using the Durnin and Womersly method (Baumgartner & Jackson, 1982).

Immediately following the physical measurements, subjects completed a demographic questionnaire about their experience and goals in their sport, as well as their perceptions of coach and peer influences on their weight loss habits. In addition, they completed the Rosenberg Self-Esteem Scale, Marten's Sport Competition Anxiety Test (SCAT), the Body Shape Questionnaire (BSQ) and the Dutch Eating Behaviour Questionnaire (DEBQ).

As noted above, all physical data for the basketball players were taken by the other researchers, as part of a concurrent study at the University of Victoria. The basketball players completed the demographic questionnaire, the Self-Esteem Scale, the SCAT, the BSQ and the DEBQ during one testing session prior to one of their regular practices.

3.2 DEPENDENT VARIABLES

The dependent variables in this study were the three subscales of the Dutch Eating Behaviour Questionnaire. Specifically:

(a) The score on the restrained eating scale.

(b) The score on the emotional eating scale.

(c) The score on the external eating scale.

3.4 INDEPENDENT VARIABLES

The independent variables were:

(a) The score on the Rosenberg Self-Esteem Scale.

(b) The score on Sport Competition Anxiety Test.

(c) The score on the Body Shape Questionnaire.

(d) The social score determined by the demographic questionnaire.

(e) The sport in which the subjects participated.

(f) Body Mass Index.

(g) Body fat percentage.

3.5 LIMITATIONS AND DELIMITATIONS

1. The subjects were limited to female athletes competing at a university level in the sports of swimming, field hockey, soccer, rowing and basketball. Readers should be cautious about generalising the findings to males, to other sports and to other age groups.

2. The results of the study are limited by the honesty and accuracy with which the subjects responded to the questionnaires.

3. The results of the study are limited by the accuracy of the appraisers, reliability across appraisers and reliability of the measurements used for the body fat and body mass index assessments.

3.6 INSTRUMENTATION

3.6.1 Demographic Questionnaire:

The demographic questionnaire included questions on the subject's experience and goals in her sport. The questions regarding social and peer influence on dieting behaviour, were adapted by the researcher from Neumark-Sztainer, Butler & Palti, (1995), a non-athletic study of eating disorders. Questions were rated on a four point likert scale with the exception of the question rating perceived coach's concern with the athlete's weight, which was on a three point scale.

3.6.2 Rosenberg's Self-Esteem Scale:

The test consists of a ten item scale, scored on a four point likert scale, which measures the self-acceptance aspect of self-esteem. A higher score indicates lower self-esteem. It has an alpha level of .81 showing high internal validity (Neumark-Sztainer, Butler & Palti, 1996).

3.6.3 Marten's Sport Competition Anxiety Test:

The test consists of a fifteen item questionnaire, developed from an earlier test. Ten of the items are scored on a three point likert scale, and five are non-scoring "dummy" questions. A higher score indicates higher competition anxiety. It is a widely used questionnaire showing high internal and construct validity (Martens, & Simon, 1976; Cox, Qiu & Liu,1993). Corcoran (1989) reported strong validity of the SCAT,

noting that there was a correlation of .56 between the SCAT and how a player sees him or herself just before competition.

3.6.4 Body Shape Questionnaire:

The test was developed by Cooper, Taylor, Cooper & Fairburn (1987) to assess concerns about body shape in young western women. It is a 34 item questionnaire scored on a six point likert scale. A higher score is indicative of disturbances with body image. A mean score of 136.9 was obtained for patients with bulimia nervosa, compared with a mean score of 81.5 for a control group (Cooper et al., 1987). It shows high internal and external validity (Cooper & Taylor, 1988).

3.6.5 Dutch Eating Behaviour Questionnaire:

The test was developed by van Strien, Frijters, Bergers & Defares (1986) as a measure of eating behaviours. It is a 33 item questionnaire scored on a five point likert scale with three subscales of eating behaviour: restrained eating, emotional eating and external eating. High scores on the restrained eating scale have shown high correlations with subjects who were watching their weight as well as with anorexic and bulimic patients (Wardle, 1987). Bulimic patients scored significantly higher on the external scale than controls or anorexics, with anorexics scoring significantly lower than controls; similarly, bulimic patients scored higher on emotional eating than controls with anorexics scoring lower than controls (Wardle, 1987). The measure has been shown to have high internal consistency and validity (Gorman & Allison, 1995).

3.7 DATA ANALYSIS

A canonical correlation analysis was run using SPSS 6.13. Data was collapsed across all subjects for these analyses. The dependent variables (scores on the restrained, emotional and external eating scales of the DEBQ) were compared to the variables of: self-esteem, competition anxiety, social influences, and body image. A second canonical correlation was run between the dependent variables and body fat and BMI.

Pearson correlations were also run between all the variables to identify possible individual correlations.

Following the canonical correlations, individual regression analyses (ANOVAs) were performed to determine any predictive relationships between the set of dependent variables and the independent variables.

To examine the sport identity questions, subjects were grouped according to the sport in which they participate and a multivariate analysis of variance (MANOVA) was run to see if there were any differences on the scores of the dependent variables when subjects were divided into different sporting groups. Finally, the subjects were grouped as athletes who competed on a team (soccer, field hockey and basketball) and those who competed individually (swimming and rowing) and a MANOVA was run to determine any differences on the scores of the dependent variables.

CHAPTER IV

RESULTS

This chapter presents the results of the data analyses performed on the responses of the subjects to the various questionnaires. Descriptive data for all the subjects are reported initially. Statistical results have been organised to include two sections, the first of which is the pair of canonical correlation analyses. The first canonical correlation related two sets of variables: the dependent set which were referred to as the eating disorder symptoms, and the independent set which were the risk factors. The second canonical correlation related the dependent variable set and a set of physical measurements: body fat and body mass index. The other section of the results include a set of MANOVAs on the eating disorder symptoms and the subjects in various groups.

4.1 DESCRIPTIVE RESULTS

The means and standard deviations for demographic data for all the subjects are included in Table 1. Demographic data includes age, number of years involved in sport, body fat percentage, and body mass index.

The means and standard deviations of the results of the questionnaires for all subjects are reported in Table 2. The questionnaires include the restrained subscale of the Dutch Eating Behaviour Questionnaire (DEBQ), the emotional subscale of the DEBQ, the external subscale of the DEBQ, the body shape questionnaire, social pressure, Rosenberg's Self-Esteem Scale and the Sport Competition Anxiety Test. Table 3 includes the results of the questionnaires with the subjects grouped according to the

sport in which they participate. Similarly, Table 4 includes the results of the questionnaires with the subjects grouped by whether they participate in an individual sport or a team sport.

4.2 CANONICAL CORRELATION ANALYSES

(a) A canonical correlation was performed between the set of eating disorder symptoms (restrained, emotional and external eating) and the set of risk factors (body image, self-esteem, social pressure and competition anxiety). SPSS 6.13 was used to run the analyses.

There was one significant canonical correlation found relating the two sets of variables (.844, $p<.05$), accounting for 71.3% of the variance. The other two canonical correlations were not significant. Table 5 shows the correlations between the variables and the canonical variates, standardized canonical variate coefficients, within-set variance accounted for by the canonical variates (percent of variance), redundancies and canonical correlations.

With a cut-off correlation of .4, the eating disorder symptoms that were most correlated with the canonical variate were restrained and emotional eating. Among the set of risk factors, body image, self-esteem, competition anxiety and social pressure were all significantly correlated with the canonical variate. The first canonical variate indicated that those athletes who showed high restrained eating (.972) and high emotional eating (.499) also exhibited low body image (.963), low self-esteem (.428), high competition anxiety (.520) and high social pressure (.723).

Individual regression analysis showed that body image was a significant predictor of restrained eating ($t=4.89$, $p<.001$). Social pressure was also a significant predictor of restrained eating ($t=2.746$, $p<.01$). Emotional eating could be significantly predicted by body image ($t=2.076$, $p<.05$).

(b) A second canonical correlation analysis was performed between the set of eating disorder symptoms and a set of physical characteristics: body fat percentage and body mass index (BMI). SPSS 6.13 was used to run the analyses.

There was one significant canonical correlation found relating the two sets of variables (.433, $p<.05$), accounting for 18.8% of the variance. The other canonical correlation was not significant. Table 7 shows the correlation between the variables and the canonical variates, standardised canonical variate coefficients, within-set variance accounted for by the canonical variates (percent of variance), redundancies and canonical correlations.

With a cut-off correlation of .4, restrained eating was the eating disorder symptom most correlated with the canonical variate. Both body fat and BMI were significantly correlated with the canonical variate. The significant canonical variate indicated that those athletes who showed high restrained eating (.855) also had high body fat (.516) and high BMI (.988).

Individual regression analysis showed that BMI was a significant predictor of restrained eating ($t=2.02$, $p<.05$).

4.3 PEARSON CORRELATIONS

After the canonical correlations were run, individual Pearson correlations between the variables were looked at. Table 6 shows the significant Pearson correlations that were found. Of interest, it was found that high restrained eating was significantly correlated with: low body image ($r=.78$, $p<.001$), low self-esteem ($r=.33$, $p<.05$), high competition anxiety ($r=.39$, $p<.01$), and high levels of social pressure ($r= .62$, $p<.001$). It was also found that high emotional eating was significantly correlated with low body image ($r=.44$, $p<.005$), low self-esteem ($r=.33$, $p<.05$), and high competition anxiety ($r=.30$, $p<.05$). A higher body mass index was significantly correlated with poorer body image ($r=.32$, $p<.05$), and with higher levels of restrained eating ($r=.38$, $p<.01$). Poor body image was significantly correlated with low self-esteem ($r=.37$, $p<.05$), high competition anxiety ($r=.52$, $p<.001$), and high social pressure ($r=.53$, $p<.001$). Low self-esteem was also highly correlated with high competition anxiety ($r=.48$, $p<.001$).

4.4 MANOVA ANALYSES

Two MANOVA analyses were run using SPSS 6.13. The first MANOVA found no significant effect of sport team membership on any of the questionnaire results ($F=1.87$, $p>.05$). A second MANOVA found no significant effect of sport classification (team or individual) on questionnaire results ($F=1.92$, $P>.05$). Because these results were not significant, no further analyses were computed.

Table 1

Means and Standard Deviations for Demographic Data for all Subjects

	Age (in years)		Years in Sport		Body Fat Percent		Body Mass Index	
N	M	SD	M	SD	M	SD	M	SD
46	19.85	1.76	7.33	3.01	25.68	4.27	22.35	2.21

Table 2

Means and Standard Deviations for all Subjects on Questionnaire Results

	Restrained Eating		Emotional Eating		External Eating		Body Image		Self Esteem		Competition Anxiety	
N	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
46	23.98	8.56	31.87	9.21	32.17	5.04	76.57	26.42	16.85	3.93	20.96	4.72

Table 2 (continued)

	Social Pressure	
N	M	SD
46	5.74	1.37

Table 3

Means and Standard Deviations of Questionnaire Results with Subjects Grouped According to Team Membership

		Restrained Eating		Emotional Eating		External Eating		Body Image		Self Esteem	
Team	n	M	SD	M	SD	M	SD	M	SD	M	SD
Swimming	8	22.13	5.3	35.13	6.96	33.0	6.52	62.63	14.9	18.13	2.64
Field Hockey	8	24.00	9.87	26.75	6.67	32.63	5.01	74.63	22.58	13.50	2.20
Basketball	10	19.00	6.75	35.00	9.61	31.90	3.60	73.0	24.87	16.70	4.03
Rowing	8	28.63	5.80	33.63	8.30	28.25	2.55	84.00	23.49	18.25	4.16
Soccer	12	26.25	10.72	29.33	11.10	34.17	5.47	85.17	35.45	17.42	4.50

Table 3 (continued)

		Competition Anxiety		Social Pressure	
Team	n	M	SD	M	SD
Swimming	8	22.00	3.78	5.50	1.51
Field Hockey	8	17.75	4.65	5.88	1.36
Basketball	10	20.00	4.50	5.40	0.84
Rowing	8	22.88	5.82	5.38	0.92
Soccer	12	21.92	4.17	6.33	1.83

Table 4

Means and Standard Deviations of Questionnaire Results with Subjects Grouped According to Sport Classification

		Restrained Eating		Emotional Eating		External Eating		Body Image		Self Esteem	
Class	n	M	SD	M	SD	M	SD	M	SD	M	SD
Team	16	23.23	9.56	30.53	9.88	33.00	4.74	78.30	28.72	16.13	4.07
Individual	30	25.38	6.33	34.38	7.44	30.63	5.38	73.31	21.98	18.19	3.37

Table 4 (continued)

		Competition Anxiety		Social Pressure	
Class	n	M	SD	M	SD
Team	16	20.17	4.58	5.90	1.45
Individual	30	22.44	4.76	5.44	1.21

Table 5

Correlations, Standardised Canonical Coefficients, Canonical Correlations, Percents of Variance, and Redundancies Between the Variable Set of Eating Disorder Symptoms and the Set of Risk Factors

	First Canonical Variate	
	Correlation	Coefficient
Eating Disorder Symptoms		
RESTRAINED	.972	.903
EMOTIONAL	.499	.180
EXTERNAL	.249	.133
Percent of variance	41.864	
Redundancy	29.845	
Risk Factors		
BODY IMAGE	.963	.745
SELF-ESTEEM	.428	.107
COMPETITION ANXIETY	.520	.022
SOCIAL PRESSURE	.723	.312
Percent of variance	47.554	
Redundancy	33.901	

Table 6

Correlations, Standardised Canonical Coefficients, Canonical Correlations, Percents of Variance, and Redundancies Between the Variable Set of Eating Disorder Symptoms and the Physical Measurements

	First Canonical Variate	
	Correlation	Coefficient
Eating Disorder Symptoms		
RESTRAINED	.855	1.031
EMOTIONAL	-.206	-.056
EXTERNAL	-.119	-.098
Percent of variance	26.274	
Redundancy	4.936	
Physical Variables		
BODY FAT	.988	1.118
BODY MASS INDEX	.516	-.203
Percent of variance	62.108	
Redundancy	11.668	

Table 7

Pearson Correlations Between Individual Variables

	Restrained Eating	Body Image	Body Mass Index	Social Pressure	Emotional Eating	Self Esteem
Restrained Eating	1.000	.783***	.376**	.619***	.323*	.331*
Body Image	.783***	1.000	.320*	..532***	.439**	.374**
Body Mass Index	.376**	..320*	1.000	.276	-.061	.024
Social Pressure	.619***	.532***	.276	1.000	.168	.099
Emotional Eating	.323*	.439**	-.061	.168	1.000	.333*
Self Esteem	.331*	.374**	.024	.099	.333*	1.000
Competition Anxiety	.389**	.522***	.149	.183	.297*	.482**

Table 7 (continued)

	Competition Anxiety
Restrained Eating	.389**
Body Image	.522***
Body Mass Index	.149
Social Pressure	.183
Emotional Eating	.297*
Self Esteem	.482**
Competition Anxiety	1.000

- * p<.05
- ** p<.01
- *** p<.001

CHAPTER V

DISCUSSION

This chapter will include a discussion of the results of this study, relate the results to previous literature, and propose future research directions. The discussion will be divided into the subsections of: risk factors, physical measurements, sport classification and conclusions.

5.1 RISK FACTORS

There was one significant canonical correlation found relating the set of dependent variables (restrained, emotional and external eating) and the set of psychological risk factors (body image, self-esteem, competition anxiety and social pressure). This variable, accounting for 71.3% of the variance, showed that athletes who had high restrained and emotional eating, also had low body image, low self-esteem, high competition anxiety and high perceived social pressures. These results partially supported the research of Williamson et al. (1995) and Neumark-Sztainer et al. (1996) who reported that among other factors, body image was a strong predictor of dieting behaviour.

Williamson et al. (1995) used structural equation modelling to study the interrelationship between various variables and concluded that social influence, performance anxiety and self-appraisal, when mediated by body image, were strong predictors of eating disorder symptoms. Neumark-Sztainer et al. (1996), also using structural equation modelling, found that body dissatisfaction, low self-esteem and a

strong drive for thinness were strong predictors of dieting behaviours and uncontrolled eating. While not using structural equation modelling, the present study found similar results in that the variables of body image, self-esteem, social pressure and competition anxiety were all related to indicators of disordered eating (restrained and emotional eating). Only body image and social pressure were significant predictors of restrained eating and the only significant predictor of emotional eating was body image.

The present study found low body image was highly correlated with both restrained and emotional eating. Restrained eating, emotional eating and body image have all been identified previously in clinical populations of eating disordered patients. Restrained eating, emotional eating and external eating are subscales of the Dutch Eating Behaviour Questionnaire (DEBQ). In a validation study of the DEBQ, Wardle (1987) reported that bulimic patients showed significantly higher emotional eating than overweight or anorexic patients, while anorexics had lower scores than normal women. Restrained eating was higher for both bulimics and anorexics than in normal patients. Body image can be measured with the Body Shape Questionnaire (BSQ) and it has been reported that bulimics score significantly higher than control subjects on this scale (Cooper et al., 1987).

With both restrained and emotional eating having high correlations with low body image it may be that the subjects in this study who showed disordered eating symptoms tended towards bulimia. This however, is only speculation as the study did not specifically investigate those disorders for which individuals could be at risk. The literature suggests such subjects could have been at risk for both disorders. For example,

Neumark-Sztainer et al. (1996) found that higher body dissatisfaction was a strong predictor of both dieting behaviours and uncontrolled eating.

The strong correlation of low body image with eating disorder symptoms, as well as the significant predictive nature of this variable for eating disorder symptoms, supports much of the previous research. Research involving nonathletes has consistently found that body image is a significant predictor of disordered eating (Molinari, 1995; Cooper, Taylor, Cooper & Fairburn, 1987). Among athletes, Williamson et al. (1995), found that over concern with body size was a strong and primary predictor of eating disorder symptoms in athletes. Other researchers have concluded however, that most college level female athletes show no disturbance with body image, with the exception of gymnasts (Warren, Stanton & Blessing, 1990). Wilson & Eldredge (1992) speculate that the greater an athlete's body shape deviates from what is considered "ideal" for her sport, the greater the risk of the development of an eating disorder. The present study found a small but significant correlation between high body mass index and low body image. This shows partial support of Wilson & Eldredge's (1992) hypothesis. It may be that athlete's with a higher body mass index than their peers, although still within a healthy range, felt greater body dissatisfaction and therefore the need to engage in unhealthy weight loss behaviours.

Furst & Tanebaum (1984) reported that athletes with higher anxiety showed higher body dissatisfaction, while Williamson et al. (1995) found that competition anxiety, when mediated by body image was a predictor of disordered eating. A similar result was found in the present study with a significant correlation showing between low

body image and high competition anxiety. Athletes who are unhappy with their appearance may feel greater anxiety when they have to perform, particularly in front of a crowd.

Social pressure was found to be significantly correlated with eating disorder symptoms and was a significant predictor of restrained eating. This supports the results of several studies. For example, Williamson et al. (1995) found that social influence, when mediated by body image was a strong predictor of eating disorder symptoms. Rosen & Hough (1988) reported that athletes who were engaging in unhealthy weight loss techniques did so after being told they were too heavy by their coaches. Also, although they refrain from making any concrete conclusions, Sundgot-Borgen (1994a) reported that less educated coaches tended to recommend the use of laxatives or vomiting. Finally, Neumark-Sztainer et al. (1996) found very weak correlations between socio-environmental factors and eating disorder behaviours in adolescent females and that the effect of these factors on eating behaviour occurred indirectly through their effect on personal factors.

The measure of social variables in this study was adapted from Neumark-Sztainer et al. (1996) for use with an athletic population. However, as pointed out by these authors, although social factors have been greatly emphasized as potentially leading to eating disorders, there are very few validated measures of this in the literature. Williamson et al. (1995) developed their own five item questionnaire to assess perceived pressure of coaches and peers on body weight and size. They did not however, outline these items in their paper. The results reported by other researchers (Rosen & Hough,

1988) verges on the anecdotal with weak conclusions only being able to be drawn. The results found by this study indicate that there is a relationship between coach and peer influence and disordered eating behaviour. These results, however, should be recognised as being very tenuous and future research should look closer at this variable. Reliable measures should be developed for both the general and athletic populations in order to evaluate this variable.

Self-esteem also showed a strong relationship with the development of eating disorders in athletes in this study. Self-esteem was significantly correlated with restrained and emotional eating. These results support much of the previous literature which has found low self-esteem to be a "well-recognised trait of those with eating disorders and could be a precipitating factor in the development of eating disorders" (Lindeman, 1994). Neumark-Sztainer et al. (1996) found that self-esteem was a strong predictor of dieting and bingeing. Similarly, Davis & Cowles (1989) found that emotional well-being was a predictor of bulimia. In their study on runners however, Parker, Lambert & Burlingame (1994) reported that whether eating disordered or not, these athletes did not show significantly high levels of psychopathology, including low self-esteem, although other, non-athletic, eating-disordered subjects did show high levels of psychopathology. The present study used a non sport-specific measure of self-esteem and so was unable to conclude how closely related the athlete's self-esteem is related to her perception of athletic achievement. Self-esteem, however, was also highly correlated with competition anxiety and so it may be that because sport can be a large part of a

university athlete's life, self-esteem may be closely connected with how she feels about competition.

However this may not necessarily be the case and other factors outside of sport could be major influences on an athlete's mental state. Sundgot-Borgen (1994a) has reported that traumatic events can be a precipitating factor in the development of an eating disorder. For example in this study, the researcher was told after testing was completed that a few of the subjects had lost a close friend on campus to suicide. One athlete in particular reacted negatively to what she believed to be was a high body fat percentage. In consultation with her coach however, it was hypothesised that her reaction to the questionnaires would most likely have been different a week prior to the study as she had been very positive, having just performed very well in competition. Instead, because of the recent loss of a friend, she was in a poor frame of mind at the time of testing. This underlies the subjective nature of questionnaires, and the potential interrelationship of all the variables.

5.2 PHYSICAL MEASUREMENTS

A significant canonical correlation was found linking the set of eating disorder symptoms and the physical measures, accounting for 18.8% of the variance. Restrained eating was significantly correlated with body mass index (BMI). It was the athletes with the higher BMI who showed higher levels of restrained eating, indicating that athletes with a higher height to weight ratio engaged in restrictive eating behaviour. It should be noted that of the athletes out of the BMI range considered healthy, none were in the high

range (suggesting obesity), while a few were in the low range, indicating they were underweight.

The relationship of BMI to eating disorder symptomology is unclear. The results of this study indicated that athletes with higher BMIs tended to score higher on a measure of restrained eating. Davis & Cowles (1989) report however, that athletes in a thin body group (e.g. runners) had BMI scores in the low unhealthy range, although the group also had a significantly higher score indicating a desire to lose weight (over a normal build or control group). Other researchers concluded, however, that female college athletes were within the normal range for body mass and eating patterns, (Warren, Stanton & Blessing, 1990). They found there were no significant differences between runners, gymnasts or athletic controls on BMI, although gymnasts showed poorer body image. Similarly, Crago, Yates, Beutler & Arismendi (1985) found that female intramural level college athletes were of normal weight or heavy for their height and concluded anorexia was not prevalent. These researchers however, did not include a specific eating disorder inventory and used BMI as a primary indicator of anorexia, excluding the possibility of other unhealthy diet habits such as bingeing or purging. It may be that looking at BMI as a variable by itself may be too simplistic and conclusions can not be drawn to whether this variable is a viable measure of determining which athletes may be engaging in unhealthy diet practices.

Body fat was not correlated with any variable except for BMI and body image. Athletes with higher body fat tended to have a poorer body image which is supportive of previous work. Although none of the athletes who participated in this study were obese,

these results may be indicative of the strong belief that a thin body type is the physical ideal in modern western culture. Media glorification of extremely low body fat may have an influence on what an individual believes is considered excessive body fat and athletes may not be as educated as they should be on the subjects of body composition and nutrition. From anecdotal comments, it appeared that some of the subjects participated in this study specifically because they wanted to find out their body fat percentage, although they were warned that the measure used could be inaccurate. In an effort to educate one subject about average ranges of fat percentage for female athletes (generally 20-27%, Fox, Bowers & Foss (1993)) the subject noted the lower ranges for distance runners and commented that she "should have stayed in track". It is clear that education is necessary for athletes, as well as for coaches and trainers, to counter the effects of inaccurate portrayals of what body composition constitutes a healthy and by implication, a successful athlete.

5.3 SPORT CLASSIFICATION

The results showed no significant relationship between sport team membership and eating disorder symptoms. These results are not surprising as the subjects were from a fairly homogenous group of sport classes. None of the athletes could be described as being in an aesthetic or weight-restricted sport. Although swimming can be classified as an endurance sport (Sundgot-Borgen, 1993), it does not necessarily emphasise a lean-body as being advantageous. Supportive of this position, Sundgot-Borgen (1993), found

that among sports classified as endurance, swimmers did not show high prevalence rates of eating disorders while cross-country skiers and distance runners did have significantly higher numbers of athletes with these disorders. The results of the present study do not differentiate among the teams involved as having a greater prevalence athletes at risk for an eating disorder.

Similarly, when grouped into athletes who compete individually or as a team, there were no significant differences in eating disorder symptomology. This does not preclude the fact, however, that there were individual athletes in this study who scored highly on the subscales of the DEBQ, indicating unhealthy eating behaviour. Although previous research has indicated that there are some sport classes that may have a greater number of athletes who are at a higher risk for the development of an eating disorder, it should be reinforced that there are athletes in all sports who may show risk factors for eating disorders, which might lead to anorexia athletica.

5.4 FUTURE RESEARCH

There is much research needed yet in this area. Many questions still exist about the nature of eating disorders in athletes and which athletes may be at risk. Future researchers should consider a number of different variables as possible risk factors and should not consider the variables in isolation. Structural equation modelling may be a strong tool in determining the interrelationship of variables in this area. Although some researchers have shown that some athletic groups may have a higher prevalence rate of

athletes with eating disorders, all athletes should be considered as potentially at risk for these disorders and should be included in future research designs. Researchers should keep in mind the inherent problems with research in this area including the misrepresentation of diet and eating behaviours on the part of the subject. This may be because the subject is afraid of having her disorder discovered or it may that she simply does not believe that a problem exists. Researchers may consider paying closer attention to related risk factors such as poor self-esteem or high competition anxiety to determine whether an athlete is at risk of developing an eating disorder.

5.5 CONCLUSIONS

Many researchers have identified self-selection of subjects as a problem in the area of research of eating disorders (Shaw & Garfinkel, 1990; Sundgot-Borgen, 1993; Wilmore, 1991). This study was potentially affected in this way because it used volunteers and it was a possibility that athletes who had an eating disorder or a concern for their eating habits did not choose to participate. The individuals who did volunteer may have been the healthy ones who felt they had nothing to lose by participating. Despite this possibility, there were a few subjects who participated in order to find out about their body fat percentage, which in itself, may be indicative of a disturbance with body image.

Another problem related to the self-selection of subjects, is the subjective nature of questionnaires. As Wilmore (1991) points out, subjects may misrepresent themselves on the questionnaires for fear of being caught. This is also a limitation in the present

study. The DEBQ, however, may be more resistant to this problem. Gorman & Allison (1995) report no significant differences between "fake bad", "fake good" or control groups on the restraint scale of the DEBQ. There were a number of questionnaires used in this study, however, and the possibility of inaccurate responses should be taken into account.

The purpose of this research was to attempt to identify potential risk factors in the development of eating disorders in athletes. All risk factors looked at: self-esteem, competition anxiety, social pressure and body image were significantly correlated with indicators of unhealthy diet practices. These factors however, do not exist in isolation and so should not be treated as such. Studies by Williamson et al. (1995) and Neumark-Sztainer et al. (1996) showed through structural equation modelling the possible model of interrelationship between some of these variables. This study concluded that there are many factors that can play a part in the development of eating disorders in athletes.

As outlined earlier, Thompson & Sherman (1993) have outlined three possible roles sport can take in the development of an eating disorder in an athlete: sport can attract, through the lure of exercise perhaps, the already at risk individual; participation can result in the disorder; or for those predisposed to an eating disorder, sport can precipitate its development. The risk factors studied in this research can be a part of any of these possible roles. It is important, therefore, that athletes, coaches and trainers should be educated in the area of eating disorders in athletes as well as in nutrition and health. Sundgot-Borgen (1994) has reported that among those athletes who were told to lose weight by a coach, it was those who started unsupervised dieting that were more

likely to develop an eating disorder. Education is a key to the prevention of unhealthy weight control and dieting behaviours among athletes.

Strategies for the prevention and intervention of eating disorders in athletes have been outlined by Bickford, Daly, Abood, Cleveland & Moriarty (1992). Their recommendations for prevention include providing the team with professional health education and ensuring the coach is up to date on current issues concerning nutrition. They also recommend not overemphasising weight reduction, particularly because optimal body fat percentages for competition are unknown. Coaches and trainers should avoid careless comments about an athlete's weight and should avoid giving weight goals to be reached in a certain time. Outside supervision should be used with any weight loss or weight control programs. Coaches should also watch for early signs of eating disorders including: severe food restriction, low energy levels, isolation, and signs of over training.

In addition to the recommendations made by Bickford et al. (1992) there are other warning signs of which coaches and trainers should be aware. Some of these have been identified in this study including: body image disturbances, low self-esteem, pressure from coaches, and competition anxiety.

The pressure inherent in competitive athletics may be too much for some athletes resulting in an unhealthy mental state. Add to this the societal pressures of a thin body type as being the current ideal and coaches who may be too single minded in their pursuit of success for their athlete and there is a strong case for the development of an eating disorder.

In summary, there are many, varied risk factors for the development of eating disorders in athletes. These variables can include: self-esteem, body image, social pressure and competition anxiety. These factors can all play a role in eating disorders in athletes but should not be considered independently. Although previous research has identified some sports with higher prevalence rates of athletes with eating disorders, the present research found indicators of unhealthy dieting practices in sports that do not fall into these classifications. Any athlete should be considered potentially at risk when the factors outlined above are present.

REFERENCES

Bailey, S. M., Goldberg, J. P., Swap, W. C., Chomitz, V. R., & Houser, R. F. (1990). Relationships between body dissatisfaction and physical measurements. International Journal of Eating Disorders, 9, 457-461.

Baumgartner, T. & Johnson, A. (1982). Measurement for Evaluation in Physical Education and Exercise Science (3rd ed.). Dubuque, IA: Wm. C. Brown Publishers.

Beals, K.A., & Manore, M. M. (1994). The prevalence and consequences of subclinical eating disorders in female athletes. International Journal of Eating Disorders, 4, 175-195.

Bickford, B., Daly, J. A., Abood, D. A., Cleveland, M. E., & Moriarty, D. (1992) Strategies for Prevention/Intervention. In Brownell, K. D., Rodin, J., & Wilmore, J. H. (1992). Eating, Body Weight and Performance in Athletes. Philadelphia: Lea & Febiger.

Brownell, K. D., Rodin, J., & Wilmore, J. H. (1992). Eating, Body Weight and Performance in Athletes. Philadelphia: Lea & Febiger.

Brustad, R. J. (1993). Youth in sport: psychological considerations. In Singer, R. N., Murphey, M., & Tennant, L. K. (Eds.), Handbook of Research on Sport Psychology (pp. 695 -717). New York: Macmillan.

Canadian Medical Association (1995). Physical activity promotes self-esteem. Canadian Medical Association Journal, 153, 317-318.

Cash, T. F., & Green, G. K. (1986). Body weight and body image among college women: perception, cognition and affect. Journal of Personality Assessment, 50, 290-301.

Cooper, P. J., & Taylor, M. J. (1988). Body image disturbance in bulimia nervosa. British Journal of Psychiatry, 153, 32-36.

Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C. G. (1987). The development and validation of the body shape questionnaire. International Journal of Eating Disorders, 6, 485-494.

Corcoran, K. J. (1989). Is competitive anxiety an observable behavior?: A sociometric validity study of the SCAT. Journal of Personality Assessment, 53, 677-684.

Cox, R. H. (1994). Sport Psychology: Concepts and Applications. (3rd ed.). Dubuque, IA: Brown & Benchmark.

Cox, R. H., Qiu, Y., & Liu, Z. (1993) Overview of sport psychology. In Singer, R. N., Murphey, M., & Tennant, L. K. (Eds.), Handbook of Research on Sport Psychology (pp. 3-31). New York: Macmillan.

Crago, M., Yates, A., Beutler, L. E., & Arizmendi, T.G. (1985). Height-weight ratios among female athletes: are collegiate athletics the precursors to an anorexic syndrome. International Journal of Eating Disorders, 4, 79-87.

DePalma, M. T., Koszewski, W. M., Case, J. G., Barile, R. J., DePalma, B. F., & Oliaro, S. M. (1993). Weight control practices of lightweight football players. Medicine and Science in Sports and Exercise, 25, 694-701.

Davis, C. (1992). Body image, dieting behaviours, and personality factors: a study of high-performance female athletes. International Journal of Sport Psychology, 23, 179-192.

Davis, C., & Cowles, M. (1989). A comparison of weight and diet concerns and personality factors among female athletes and non-athletes. Journal of Psychosomatic Research, 33(5), 527-536.

Davis, C., Kennedy, S. H., Ravelski, E., & Dionne, M. (1994). The role of physical activity in the development and maintenance of eating disorders. Psychological Medicine, 24, 957-967.

Docherty, D. (1996). Measurement in Pediatric Exercise Science. Champaigne, ISl: Human Kinetics.

Fox E., Bowers, R., & Foss, M. (1993). The Physiological Basis for Exercise and Sport (5th ed.). Dubuque, IA: Brown & Benchmark.

Furst, D. M., & Tenebaum, G. (1984). A correlation of body-cathexis and anxiety in athletes and nonathletes. International Journal of Sport Psychology, 15, 160-168.

Gorman, B. S., & Allison, D. B. (1995). Measures of restrained eating. In Allison, D. B. (Ed.), Handbook of Assessment Methods for Eating Behaviours and Weight-related Problems (pp. 149-181). London: Sage Publications.

Halliman, S.C. (1991). Eating Disorders and Athletes: A Handbook for Coaches. Dubuque, IA: Kendall/Hunt.

Hallinan, C. J., Pierce, E. F., Evans, J. E., DeGrenier, J. D., & Andres, F. F. (1991). Perceptions of current and ideal body shape of athletes and nonathletes. Perceptual and Motor Skills, 72, 123-130.

Hamilton, L. H., Brooks-Gunn, J., & Warren, M. P. (1985). Sociocultural influences on eating disorders in professional female ballet dancers. International Journal of Eating Disorders, 4, 465-477.

Huddy, D. C., Nieman, D. C., & Johnson, R. L. (1993). Relationship between body image and percent body fat among college male varsity athletes and nonathletes. Perceptual and Motor Skills, 77, 851-857.

Johnson, C., & Connors, M. E. (1987). The Etiology and Treatment of Bulimia Nervosa: A Biopsychosocial Perspective. New York: Basic Books.

Katzman, M. A., & Wolchik, S. A. (1984). Bulimia and binge eating in college women: a comparison of personality and behavioural characteristics. Journal of Consulting and Clinical Psychology, 52, 423-428.

Lindeman, A. K. (1994). Self-esteem: Its application to eating disorders and athletes. International Journal of Sport Nutrition, 4, 237-252.

Lopiano, D. A., & Zotos, C. (1992) Modern Athletics: the pressure to perform In Brownell, K. D., Rodin, J., & Wilmore, J. H. (Eds.), Eating, Body Weight and Performance in Athletes. Philadelphia: Lea & Febieger.

Marsh, H. W., & Roche, L. A. (1996). Predicting self-esteem from perceptions of actual and ideal ratings of body fatness: is there only one ideal "supermodel"? Research Quarterly for Exercise and Sport, 67, 13-23.

Martens, S. R. & Simon, J. A. (1976). Comparison of three predictors of state anxiety in competitive situations. Research Quarterly, 47, 381-387.

McCrea, C. W., Summerfield, A. D., & Rosen, B. (1982). Body image: a selective review of existing measurement techniques. British Journal of Medical Psychology, 55, 225-233.

Molinari, E. (1995). Body-size estimation in anorexia nervosa. Perceptual and Motor Skills, 81, 23-31.

Neumark-Sztainer, D., Butler, R. & Palti, H. (1996). Personal and socioenvironmental predictors of disordered eating among adolescent females. Journal of Nutrition Education, 28, 195-201.

Oglesby, C. A. & Hill, K. L. (1993). Gender and Sport. In Singer, R. N., Murphey, M., & Tennant, L. K. (Eds.), Handbook of Research on Sport Psychology (pp. 718-760). New York: Macmillan.

Parker, R. M., Lambert, M. J., & Burlingame, G. M. (1994). Psychological features of female runners presenting with pathological weight control behaviours. Journal of Sport and Exercise Psychology, 16, 119-134.

Pargman, D. (1993). Individual differences: cognitive and perceptual styles. In R. N. Singer, M. Murphey, & L. K. Tennant (Eds.). Handbook of Research on Sport Psychology (pp. 379-404). New York: MacMillan.

Pasman, L., & Thompson, J. K. (1988). Body image and eating disturbance in obligatory runners, obligatory weightlifters, and sedentary individuals. International Journal of Eating Disorders, 7, 759-769.

Rodin, J., & Larson, L. (1992). Social factors and the ideal body shape. In Brownell, K. D., Rodin, J., & Wilmore, J. H. (Eds.), Eating, Body Weight and Performance in Athletes: Disorders of Modern Society (pp. 146-158). Philadelphia: Lea & Febieger.

Rosen, L. W., & Hough, D. O. (1988). Pathogenic weight-control behaviour in female college gymnasts. Physician & Sportsmedicine, 16 (9), 141-146.

Rosen, L. W., McKeag, D. B., Hough, D. O., & Curley, V. (1986). Pathogenic weight control behavior in female athletes. Physician and Sportsmedicine, 14, 79-95.

Shaw, B. F., & Garfinkel, P. E. (1990). Research problems in the eating disorders.
International Journal of Eating Disorders, 9, 545-555.

Sonstroem, R. J., & Morgan, W. P. (1989). Exercise and self-esteem: rationale and model. Medicine and Science in Sports and Exercise, 21, 329-337.

Sonstroem, R. J., & Potts, S. A. (1996). Life adjustment correlates of physical self-concepts. Medicine and Science in Sports and Exercise, 28, 619-625.

Stoutjesdyk, D., & Jevne, R. (1993). Eating disorders among high performance athletes. Journal of Youth and Adolescence, 22, 271-281.

Sundgot-Borgen, J. (1993). Prevalence of eating disorders in elite female athletes. International Journal of Sport Nutrition, 3, 29-40.

Sundgot-Borgen, J. (1994a). Risk and trigger factors for the development of eating disorders in female elite athletes. Medicine and Science in Sports and Exercise, 26, 414-419.

Sundgot-Borgen, J. (1994b). Eating disorders in female athletes. Sports Medicine, 17, 176-188.

Sykoro, C., Grilo, C. M., Wilfley, D. E., & Brownell, K. D. (1993). Eating, weight, and dieting disturbances in male and female lightweight and heavyweight rowers. International Journal of Eating Disorders, 14, 203-211.

Taub, D. E., & Blinde, E. M. (1992). Eating disorders among adolescent female athletes: influence of athletic participation and sport team membership. Adolescence, 27, 833-847.

Thompson, R. A., & Sherman, R. T. (1993). Helping Athletes With Eating Disorders. Bloomingtion, IN: Human Kinetics.

van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). Dutch Eating Behaviour Questionnaire for assessment of restrained, emotional and external eating behaviour. International Journal of Eating Disorders, 5, 295-315.

Wardle, J. (1987). Eating style: a validation of the Dutch Eating Behaviour Questionnaire in normal subjects and women with eating disorders. Journal of Psychosomatic Research, 31, 161-169.

Warren, B. J., Stanton, A. L., & Blessing, D. L. (1990). Disordered eating patterns in competitive female athletes. International Journal of Eating Disorders, 9, 565-569.

Wilkins, J. A., Boland, F. J., & Albinson, J. (1991). A comparison of male and female university athletes and nonathletes on eating disorder indices: are athletes protected? Journal of Sport Behaviour, 14, 129-143.

Williamson, D. A., Netemeyer, R. G., Jackman, L. P., Anderson, D. A., Funsch, C. L., & Rabalais, J. Y. (1995). Structural equation modelling of risk factors for the development of eating disorder symptoms in female athletes. International Journal of Eating Disorders, 17, 387-393.

Wilmore, J. H. (1991). Eating and weight disorders in the female athlete. International Journal of Sport Nutrition, 1, 104-117.

Wilson, G. T. & Eldredge, K. L. (1992). Pathology and development of eating disorders: implications for athletes. In Brownell K. D., Rodin, J., & Wilmore, J. H. (Eds.), Eating, Body Weight, and Performance in Athletes: Disorders of Modern Society. Philadelphia: Lea & Febieger.

APPENDIX A

Informed Consent

The title of this project is "The identification of Psychological Predisposing Factors to Eating Disorders in Athletes." The main purpose is to determine if competition anxiety, self-esteem, or body image is correlated with any symptoms of eating disorders in athletes.

The testing will be conducted by Tanya Berry (local 8635) and any questions can be addressed to her. This is a graduate studies project under the supervision of Dr. Bruce Howe (local 7757).

The testing will take about forty five minutes and will take place in the McKinnon Gym at the University of Victoria. You will be asked to fill out four questionnaires: the Sport Competition Anxiety Test, the Rosenberg self-esteem scale, the Body Shape Questionnaire and the Dutch Eating Behaviour Questionnaire. You will be asked to fill out a short demographic questionnaire as well. Your height and weight will be measured as well as a skin fold body fat measurement. The results will be published as part of Tanya Berry's master's thesis.

Consent:

I have read the above and agree to participate in this research project at my own risk. I understand that my participation is entirely voluntary and that I may withdraw at any time with no explanations. I understand that my decision to participate or not participate in this study will have no bearing on my grade, academic or team standing.

I understand that my anonymity will be protected by the fact that my name will not be attached to the results of the study and that only the researcher of this study and Lynneth Wolski, head of the fitness testing center, will have access to any raw data. I will be identified only by a code number, arbitrarily assigned on the first day of testing. I also understand that all results will be confidential and kept in a locked cabinet and that the data will be destroyed immediately if I withdraw before the end of the study or after analysis has been completed.

Signature______________________________

Date__________________________________

Tanya Berry 721 8635

APPENDIX B

Informed Consent Supplement

I ________________________give permission for Tanya Berry to use the body fat, height and weight data collected by Dr. Catherine Gaul. The data will be used in Tanya's study on "Psychological Predisposing Factors to Eating Disorders in Athletes." I understand that my anonymity is still guaranteed and that no one else will have access to this data.

Signed____________________________________

Date______________________________________

APPENDIX C

Demographic Questionnaire

Please fill in the following questionnaires as accurately as possible. There are no right or wrong answers.

Sport in which you participate:

Age:

How many years have you been involoved in your sport at a competitive level?

Do you plan to continue competing after your university career?

If so, at what level (eg national)?

Please circle the appropriate answer:

Do you discuss dieting or weight loss with frinds or teammates?

Never	Sometimes	Often (weekly)	Everyday

Do you exercise outside of your coach's prescription?

Never	1-2 hrs/wk	3-4 hrs/wk	more than 5 hrs/wk

Do you feel your coach is concerned with your weight?

Not at all Concerned	Somewhat Concerned	Very Concerned

To be filled in by researcher:

BMI:

Skin folds: Scapular: Bicep: Tricep:

Hip:

APPENDIX D

Rosenberg's Self-Esteem Scale

SELF-ESTEEM SCALE

DIRECTIONS: A number of situations have been described below. Read each statement and then circle the appropriate "X" to the right of the statement. There are no right or wrong answers.

		Strongly Disagree	*Disagree*	*Agree*	*Strongly Agree*
1.	On the whole, I am satisfied with myself.	X	X	X	X
2.	At times I think I am no good at all.	X	X	X	X
3.	I feel that I have a number of good qualities.	X	X	X	X
4.	I am able to do things as well as most other people.	X	X	X	X
5.	I feel I do not have much to be proud of.	X	X	X	X
6.	I certainly feel useless at times.	X	X	X	X
7.	I feel that I'm a person of worth, at least on an equal plane with others.	X	X	X	X
8.	I wish I could have more respect for myself.	X	X	X	X
9.	All in all, I am inclined to feel that I am a failure.	X	X	X	X
10.	I take a positive attitude toward myself.	X	X	X	X

APPENDIX E

Marten's Sport Competition Anxiety Test

Illinois Competition Questionnaire - SCAT

Below are some statements about how persons feel when they compete in sports and games. Read each statement and decide if you HARDLY EVER, SOMETIMES, or OFTEN feel this way when you compete in sports and games. There are no right or wrong answers. Do not spend too much time on any one statement. Remember to choose the word that describes how you usually feel when competing in sports and games.

Statement	1 hardly ever	2 sometimes	3 often
1. Competing against others is socially enjoyable.	1 hardly ever	2 sometimes	3 often
2. Before I compete I feel uneasy.	1 hardly ever	2 sometimes	3 often
3. Before I compete I worry about not performing well.	1 hardly ever	2 sometimes	3 often
4. I am a good sportsman when I compete.	1 hardly ever	2 sometimes	3 often
5. When I compete I worry about making mistakes.	1 hardly ever	2 sometimes	3 often
6. Before I compete I am calm.	1 hardly ever	2 sometimes	3 often
7. Setting a goal is important when competing.	1 hardly ever	2 sometimes	3 often
8. Before I compete I get a queasy feeling in my stomach.	1 hardly ever	2 sometimes	3 often
9. Just before competing I notice my heart beats faster than usual.	1 hardly ever	2 sometimes	3 often
10. I like to compete in games that demand considerable physical energy.	1 hardly ever	2 sometimes	3 often
11. Before I compete I feel relaxed.	1 hardly ever	2 sometimes	3 often
12. Before I compete I am nervous.	1 hardly ever	2 sometimes	3 often
13. Team sports are more exciting than individual sports.	1 hardly ever	2 sometimes	3 often
14. I get nervous waiting to start the game.	1 hardly ever	2 sometimes	3 often
15. Before I compete I usually get uptight.	1 hardly ever	2 sometimes	3 often

APPENDIX F

Body Shape Questionnaire

BSQ

We should like to know how you have been feeling about your appearance over the **PAST FOUR WEEKS**. Please read each question and circle the appropriate number to the right. Please answer all the questions.

OVER THE PAST FOUR WEEKS:	Never	Rarely	Sometimes	Often	Very Often	Always
1. Has feeling bored made you brood about your shape?	1	2	3	4	5	6
2. Have you been so worried about your shape that you have been feeling that you ought to diet?	1	2	3	4	5	6
3. Have you thought that your thighs, hips or bottom are too large for the rest of you?	1	2	3	4	5	6
4. Have you been afraid that you might become fat (or fatter)?	1	2	3	4	5	6
5. Have you worried about your flesh being not firm enough?	1	2	3	4	5	6
6. Has feeling full (e.g. after eating a large meal) made you feel fat?	1	2	3	4	5	6
7. Have you felt so bad about your shape that you have cried?	1	2	3	4	5	6
8. Have you avoided running because your flesh might wobble?	1	2	3	4	5	6
9. Has being with thin women made you feel self-conscious about your shape?	1	2	3	4	5	6
10. Have you worried about your thighs spreading out when sitting down?	1	2	3	4	5	6
11. Has eating even a small amount of food made you feel fat?	1	2	3	4	5	6
12. Have you noticed the shape of other women and felt that your own shape compared unfavourably?	1	2	3	4	5	6

13. Has thinking about your shape interfered with your ability to concentrate (e.g. while watching television, reading, listening to conversations)?	1	2	3	4	5	6
14. Has being naked, such as when taking a bath, made you feel fat?	1	2	3	4	5	6
15. Have you avoided wearing clothes which make you particularly aware of the shape of your body?	1	2	3	4	5	6
16. Have you imagined cutting off fleshy areas of your body?	1	2	3	4	5	6
17. Has eating sweets, cakes or other high calorie food made you feel fat?	1	2	3	4	5	6
18. Have you not gone out to social occasions (e.g. parties) because you have felt bad about your shape?	1	2	3	4	5	6
19. Have you felt excessively large and rounded?	1	2	3	4	5	6
20. Have you felt ashamed of your body?	1	2	3	4	5	6
21. Has worry about your shape made you diet?	1	2	3	4	5	6
22. Have you felt happiest about your shape when your stomach has been empty (e.g. in the morning)?	1	2	3	4	5	6
23. Have you thought that you are the shape you are because you lack self-control?	1	2	3	4	5	6
24. Have you worried about other people seeing rolls of flesh around your waist or stomach?	1	2	3	4	5	6
25. Have you felt that it is not fair that other women are thinner than you?	1	2	3	4	5	6
26. Have you vomited in order to feel thinner?	1	2	3	4	5	6
27. When in company have you worried about taking up too much room (e.g. sitting on the sofa, or a bus seat)?	1	2	3	4	5	6
28. Have you worried about your flesh being dimply?	1	2	3	4	5	6
29. Has seeing your reflection (e.g. in a mirror or shop window) made you feel bad about your shape?	1	2	3	4	5	6
30. Have you pinched areas of your body to see how much fat there is?	1	2	3	4	5	6

31. Have you avoided situations where people could see your body (e.g. communal changing rooms or swimming baths)?	1	2	3	4	5	6
32. Have you taken laxatives in order to feel thinner?	1	2	3	4	5	6
33. Have you been particularly self-conscious about your shape when in the company of other people?	1	2	3	4	5	6
34. Has worry about your shape made you feel you ought to exercise?	1	2	3	4	5	6

APPENDIX G

Dutch Eating Behaviour Questionnaire

Please answer each question by circling the most appropriate alternative.

1. If you have put on weight, do you eat less than you usually do?

    Never Not very often Sometimes Often Very often

2. Do you have a desire to eat when you are irritated or annoyed?

    Never Not very often Sometimes Often Very often

3. If food tastes good to you, do you eat more than you usually do?

    Never Not very often Sometimes Often Very often

4. Do you try to eat less at mealtimes than you would like to eat?

    Never Not very often Sometimes Often Very often

5. Do you have a desire to eat when you have nothing to do?

    Never Not very often Sometimes Often Very often

6. Do you have a desire to eat when you are fed up?

    Never Not very often Sometimes Often Very often

7. If food smells and looks good, do you eat more than you usually do?

    Never Not very often Sometimes Often Very often

8. How often do you refuse food or drink offered because you are worried about how much you weigh?

    Never Not very often Sometimes Often Very often

9. Do you have a desire to eat when you are feeling lonely?

    Never Not very often Sometimes Often Very often

10. If you see or smell something delicious, do you have a desire to eat it?

Never Not very often Sometimes Often Very often

11. Do you watch exactly what you eat?

Never Not very often Sometimes Often Very often

12. Do you have a desire to eat when somebody disappoints you?

Never Not very often Sometimes Often Very often

13. If you have something delicious to eat, do you eat it straight away?

Never Not very often Sometimes Often Very often

14. Do you deliberately eat foods that are slimming?

Never Not very often Sometimes Often Very often

15. Do you have a desire to eat when you are cross?

Never Not very often Sometimes Often Very often

16. Do you have a desire to eat when you are expecting something unpleasant to happen?

Never Not very often Sometimes Often Very often

17. If you walk past the bakers, do you have a desire to buy something delicious?

Never Not very often Sometimes Often Very often

18. When you have eaten too much, do you eat less than usual on the following days?

Never Not very often Sometimes Often Very often

19. Do you get a desire to eat when you are nervous, anxious or worried?

Never Not very often Sometimes Often Very often

20. If you walk past a snack bar or café, do you have a desire to buy something delicious?

Never Not very often Sometimes Often Very often

21. Do you deliberately eat less in order not to become heavier?

Never Not very often Sometimes Often Very often

22. Do you have a desire to eat when things are going against you or when things have gone wrong?

Never Not very often Sometimes Often Very often

23. If you see others eating, do you also have a desire to eat?

Never Not very often Sometimes Often Very often

24. How often do you try not to eat between meals because you are watching your weight?

Never Not very often Sometimes Often Very often

25. Do you have a desire to eat when you are frightened?

Never Not very often Sometimes Often Very often

26. Can you resist eating delicious foods?

Never Not very often Sometimes Often Very often

27. How often in the evening do you try not to eat because you are watching your weight?

Never Not very often Sometimes Often Very often

28. Do you have a desire to eat when you are disappointed?

Never Not very often Sometimes Often Very often

29. Do you eat more than usual when you others eating?

Never Not very often Sometimes Often Very often

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Berry, T. (1997, May). The Role of the Profile of Mood States in Assessing Male Rugby Players. Paper presented at the meeting of Connections '97, University of Victoria, Faculty of Education, Victoria, B.C.

Publications:

Strauss, E., Spellacy, F., Hunter, M., & Berry, T. (1994). Assessing believable deficits on measures of attention and information processing capacity. Archives of Clinical Neuropsychology, 9, 483-490.

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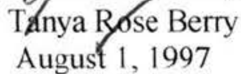
Author 

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