

**Actions Speak Louder Than Coaches: Eating Disorder Behaviour Among
Student Athletes**

BY

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Abstract

The objective of the current study was to examine the prevalence of eating disorder behaviour among student athletes. Two hundred participants (130 female, 70 male) completed an online survey that assessed participants eating disorder behaviour (EAT-26), behaviours consistent with the Adonis Complex (ACQ) and perceived social support (modified MPSS). The results revealed significant differences in eating disorder behaviour between female and male athletes, with females scoring significantly higher. No differences were found between how female and male athletes scored on the Adonis Complex Questionnaire. Significant differences were found between lean-sport and non-lean sport athletes, with lean sport athletes exhibiting more eating disorder behaviours. Furthermore, non-lean sport male athletes were found to score significantly higher than lean-sport male athletes for the Adonis Complex. Significant differences were also found across club and varsity sports, with club athletes exhibiting significantly more eating disorder behaviours than varsity athletes. Perceived social support was found to be negatively correlated to eating disorder behaviour, and when considering gender variables, level of competition and type of sport, accounted for unique variance in eating disorder behaviour. These results suggest that athletes are susceptible to negative mental health outcomes, and eating behaviours vary among athletes and sport type. The results highlight the importance of having support systems in place for student athletes and increasing awareness of athletic staff and coaches as to the seriousness and prevalence of eating disorder behaviours among their student athletes.

Table Of Contents

| | |
|---|----|
| Acknowledgements..... | iv |
| List of Tables | vi |
| Eating Disorders..... | 1 |
| Eating Disorders and Student-Athletes | 6 |
| Gender Differences in Eating Disorders | 7 |
| Lean vs. non-Lean Sport..... | 9 |
| Level of Competition and Eating Disorders | 10 |
| Perceived Social Support and Eating Disorders | 11 |
| The Current Study..... | 14 |
| Methods..... | 15 |
| Participants..... | 15 |
| Materials | 17 |
| Procedure | 19 |
| Results..... | 19 |
| Gender Differences in Eating Behaviour | 21 |
| Lean vs Non-Lean Sport Differences | 22 |
| Varsity vs. Club Sport Differences | 23 |
| Perceived Social Support and Eating Behaviours..... | 23 |

| | |
|--|----|
| Discussion..... | 26 |
| Gender Differences in Eating Behaviours and the Adonis Complex | 28 |
| Lean vs. Non-Lean Sport Differences | 30 |
| Varsity vs. Club Sport Differences | 31 |
| Perceived Social Support and Eating Disorder Behaviour | 32 |
| Limitations | 33 |
| Implications and Recommendations | 33 |
| References..... | 35 |
| Appendix A. Recruitment Materials..... | 42 |
| Appendix B. Informed Consent Form | 44 |
| Appendix C. Debrief Form Following the Study..... | 45 |
| Appendix D. Demographic Questions | 47 |
| Appendix E. Eating Attitudes Test | 48 |
| Appendix F. Behaviourial Questions..... | 49 |
| Appendix G. Mount Allison Multidimensional Scale of Perceieved Social Support..... | 50 |
| Appendix H. The Adonis Complex Questionnaire | 53 |

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List of Tables

| | |
|---|----|
| Table 1: Participant Demographics: Level of Competition and Sport-type | 16 |
| Table 2: Percentage of Eating Disorder Behaviours in the Last Six Months by Sport-type and Gender | 20 |
| Table 3: Percentage of Participants with Concerning Results on Questionnaires | 21 |
| Table 4: Correlations Between Eating Disorder Behaviours and Perceived Social Support | 24 |
| Table 5: Gender, Type of Sport, Level of Competition and Perceived Social Support as Predictors of Eating Disorder Behaviour | 26 |

Actions Speak Louder Than Coaches: Eating Disorder Behaviour Among Student Athletes

Eating disorders are complex mental illnesses that are characterized by psychological, and physiological symptoms. Eating disorders interfere with individuals' daily functioning. They are associated with other medical complications such as cardiac arrhythmia or gastric rupture (Rome & Ammerman, 2003), and in severe cases are associated with death (Smink et al., 2012). Student-athletes experience a variety of stressors both inside the classroom and within their sport; stressors such as vigorous training schedules on top of lengthy course assignments, that could lead to an increased risk of developing an eating disorder (Sundgot-Borgen & Torstveit, 2004). The present study aims to identify the prevalence of eating disorder behaviour among a sample of student-athletes within the context of a small Canadian university, while also considering effects of gender, type of sport and level of competition. The relationship between perceived social support and eating disorder symptomology will also be carefully evaluated.

Eating Disorders

Eating disorders are serious mental-health conditions that are characterized by an incessant disturbance in eating or lifestyle behaviours (such as compulsive exercise) that are associated with unsettling thoughts and emotions (Eisenberg et al., 2011). Some individuals suffering from eating disorders may engage in rigorous and lengthy sessions of daily exercise and under-eat as a means to control their appearance. Eating disorders are often accompanied by an obsession with appearance and/or weight, and anxiety to eat certain foods for fear of consequences that individuals have come to associate with

certain foods (Eisenberg et al., 2011). For example, an individual suffering from an eating disorder might avoid foods that are particularly high in carbohydrates for fear of gaining weight. Behaviours associated with eating disorders include compulsive exercise, restrictive eating or avoidance of certain foods, binge eating, vomiting, purging and the consumption of dieting medication, illegal substances, or alcohol (Eisenberg et al., 2011).

There are four types of eating disorders that are commonly diagnosed through the *Diagnostic and Statistical Manual of Mental Disorders (DSM-V)*, along with two others that have been recently acknowledged by the DSM-V and are often recognized in athletes. Individuals who suffer from anorexia nervosa often have intense fear of gaining weight and they tend to associate their self-worth to their shape/weight (American Psychiatric Association, 2013). Individuals with anorexia nervosa consistently practice behaviours that prevent them from gaining weight and they often have trouble recognizing the consequences of their substantial weight loss and behaviours (American Psychiatric Association, 2013). People with anorexia nervosa are often stereotyped as being extremely thin. This is not always the case. Research has found that 17% of people diagnosed with anorexia nervosa were considered “overweight” based on BMI evaluation (Sawyer et al., 2016). Anorexia nervosa is broken down further into two subtypes as described by the DSM-V (American Psychiatric Association, 2013). The restricting type is characterized by a dramatic restriction of food intake or engaging in excessive exercise with a lack of food consumption, leading to significant weight loss. The binge-eating/purging category of anorexia nervosa is classified by episodes of intermittent binge eating and/or purging within a period of three months.

Another eating disorder specified in the DSM-V is binge eating disorder. Binge eating involves episodes where individuals eat large amounts of food. The eating is accompanied by a loss of control where the individual feels they cannot stop eating. Binge eating disorder typically involves excessive eating episodes at least once a week for three months or longer (American Psychiatric Association, 2013). What separates binge-eating disorder from the binging category of anorexia nervosa is that the binges are not associated with the recurrent use of inappropriate compensatory behaviour, such as purging methods or compulsive exercise (American Psychiatric Association, 2013). People with binge eating disorder are often stereotyped as being overweight or obese – often an inaccurate assumption. A population-based survey spanning multiple countries found that during the last 12 months of being surveyed, 25% of individuals who lived with binge eating disorder had a body mass index within the “normal” range (Kessler et al., 2013).

Another eating disorder recognized by the DSM-V is bulimia nervosa. Individuals with bulimia nervosa are often alternating between dieting and binge eating. This disorder is classified by the DSM-V by eating in a discrete two-hour period an amount of food that is larger than what most individuals consume in a similar period under similar circumstances, and a lack of control over binge eating during the episodes (American Psychiatric Association, 2013). The binges occur at least once a week and are followed by compensatory behaviours such as vomiting, fasting, misusing laxatives, and excessively exercising to prevent weight gain. Both the binge eating, and inappropriate compensatory behaviours occur on average at least once a week for three months.

A fourth recognized eating disorder type is referred to as “other specified eating disorder”. This category includes eating disorders or eating behaviours that cause distress, impair daily functioning and social life, but do not fit the diagnostic criteria of the other three categories of eating disorders. The diagnosis for other specified feeding or eating disorder category is given in situations where the clinician determines that the presentation does not meet the criteria for any other defined specific feeding and eating disorder (American Psychiatric Association, 2013).

Another eating disorder with parallels to athleticism is orthorexia nervosa (American Psychiatric Association, 2013). To meet diagnosis, there are two proposed diagnostic criteria: Criterion A is characterized by an obsessive focus on “healthy” eating as defined by a dietary theory or set of beliefs whose specific details may vary. Weight loss may occur, but this is not seen as the primary goal. It is marked by exaggerated emotional distress in relation to food choices perceived as “unhealthy.” When an individual violates their self-imposed dietary rules, they experience an exaggerated fear of disease, a sense of personal impurity along with anxiety and shame. The DSM-V also notes that dietary restrictions may escalate over time and include elimination of entire food groups and involve more frequent/severe cleanses that are regarded as purifying or detoxifying. Criterion B is when the compulsive behaviour and mental preoccupation becomes clinically impairing by any of the following: malnutrition, severe weight loss or other health complications from diet, intra-personal distress, or impairment of social, academic, or vocational beliefs or behaviours about healthy diet and self-worth, identity, or satisfaction excessively dependent on “healthy” eating behaviour (American Psychiatric Association, 2013).

Finally, clinicians have found evidence that male athletes may be at risk for another type of psychological disorder that parallels to other eating disorders (Mitchison et al., 2021). Bigorexia, is still being researched but is currently classified by the DSM-V as an obsessive-compulsive disorder and subcategorized as a body dysmorphic disorder; but in recent years, clinicians have sought to have bigorexia reanalyzed through the lens of an eating disorder (Murray et al., 2010). Bigorexia is a psychological disorder accompanied by obsessive thoughts that an individual is inadequately muscular (American Psychiatric Association, 2013). Individuals who suffer from this disorder engage in obsessive behaviour such as spending many hours weightlifting, spending excessive amounts of money on sports equipment and protein supplements, adopting abnormal diet patterns and abusing anabolic substances (Yeloğlu, 2018). Bigorexia is also referred to as muscle dysmorphism, reverse anorexia, Adonis complex and Arnold syndrome (Yeloğlu, 2018). Bigorexia mainly affects men, and its symptoms typically appear in the late teenage/early adult years. Research on prevalence is limited. Some studies estimate its prevalence at 2.2% among men (Mitchison et al., 2021).

International research has found that the worldwide prevalence of eating disorders ranges from 2.2% to 4.6% (Galmiche et al., 2019). An estimated 840,000 to 1,750,000 Canadians have symptoms that may be characterized as an eating disorder (Galmachie et al., 2019). Approximately one in four people with anorexia nervosa or bulimia nervosa, and one in three with binge eating disorder identify as male (Galmachie et al., 2019). Anorexia nervosa has been identified as the most common eating disorder, affecting 18-47% of individuals who have received an eating disorder diagnosis (Fairburn & Cooper, 2011).

Eating Disorders and Student-Athletes

One group that may be at an increased risk of developing eating disorders are athletes and those who are involved in university level athletics (Sundgot-Borgen & Torstveit, 2004). Although athletics can be a popular and accepted way to encourage physical well-being and foster values such as discipline and teamwork, there are exceptions. Compared to non-athletes, athletes may face unique sets of stressors and pressures in their day-to-day lives. A simple injury such as a bruised knee for a non-athlete might pose minimal stress, but for an athlete, this type of injury might mean sitting on the bench and missing out on practice/competition, that could lead to psychological distress. In many high-level athletic environments, athletes are often put under pressure to perform well to earn the recognition and respect from team members, coaching staff, and athletic departments. Teams are often faced with the pressure of winning, and some athletes depend on their level of performance to fund their education through athletic scholarships. Athletes must often prove themselves worthy of earning playing time and may go to extreme measures to make their athletic abilities stand-out.

The pressures to compete in high levels of sport (i.e., at the university level) can sometimes have negative consequences for athletes. Such pressure may also encompass an emphasis on body weight (be it implicit or explicit) as athletes strive to maximize physical attributes that align with success within their sport. If this becomes a conscious concern of an athlete, they may become at risk for disordered eating behaviours (Sundgot-Borgen & Torstveit, 2004). Surprisingly, research on eating disorders in high-level scholastic athletic communities has shown mixed results. Certain studies denote that student-athletes are at an increased risk for developing an eating disorder (Hsu, 1989;

Carter & Rudd, 2005), while others indicate that athletes are at the same level of risk compared to the general population (Johnson et al, 1999; Pustivšek et al. 2015; Reinking & Alexander, 2005).

One factor that may account for what may be conservative estimates of eating disorder prevalence among student athletes in some research is the reliance on self-report measures and fear among student athletes of being identified and/or reflecting poorly on their scholastic governing body athletic departments (Johnson et al., 1999). Research from Johnson et al. evaluated athlete questionnaire responses to determine whether participants met the clinical DSM-IV criteria for specific eating disorders, as opposed to descriptively documenting general disordered eating habits. Studies typically do not include consideration of bigorexia or how gender may relate differentially to eating disorder behaviours. They tend only to survey Division I competitive schools in the US, and do not typically consider perceived social support. These areas are discussed next.

Gender Differences in Eating Disorders

Gender differences in eating disorder behaviour have been shown to exist both in the general population and in athletic communities. The sociocultural pressure to be thin may be experienced by all genders but it is found to be more prevalent among women. In the western world, dieting to control weight seems to be observed more frequently among women who are Caucasian and from a higher social class (Hsu, 1989). Body dysmorphia along with poorer self-image and body concept have also been found to be more prevalent among women (Hsu, 1989; Otto et al., 2001). Specific to the athletic community, female athletes are often considered at a higher risk of suffering from an

eating disorder than their male counterparts (Byrne & McLean, 2001; Bratland-Sanda & Sundgot-Borgen, 2013).

Johnson et al. (1999) surveyed 1445 student athletes from 11 Division I school in the National College Athletic Association (NCAA). They employed a 133-item survey designed to assess participant demographics, nature of athletic involvement, eating related behaviours including dieting, binge eating, purging (vomiting, laxatives, diuretics), drug behaviour and attitudes concerning body image and weight-related matters. The questionnaire included sub-scales from the Eating Disorder Inventory-2 (Garner, 1991), the Rosenberg Self-Esteem Scale (Rosenberg, 1979), and the Body Cathexis Scale (Secord & Jourard, 1953). Results indicated that 1.1% of female athletes met DSM-IV criteria for bulimia nervosa compared to 0% for males and 2.8% of females were identified as having clinically significant issues with anorexia nervosa, compared to 0% for males. Additionally, 10.9% of female participants reported binge eating on a weekly basis, versus 13.0% of males, and 5.5% of females reported purging behaviour on a weekly or greater basis, versus 2.0% of males (Johnson et al., 1999).

Gender differences were also considered by Krebs et al. (2019), in their study of eating disorder risk among National Collegiate Athletic Association (NCAA) Division 1 cross-country and track distance runners. Six hundred thirty-eight student athletes completed the Eating Disorder Screen for Primary Care (ESP; Cotton et al., 2003). Results found that females screened higher for eating disorders than males on the ESP with rates of 45.95% for females, and 13.66% for males. Krebs et al. (2019) also found that in distance running, both men and women were at risk of eating disorders, although the risk was higher for women.

Lean vs. non-Lean Sport

The type of sport an athlete competes in may also play a role in whether they are at an increased risk of developing an eating disorder. For example, in football, it is beneficial for the offensive linemen to be very tall and appear physically strong and bulky because they need to push other players out of the way. Offensive linemen would perform less effectively if they were 150cm tall and weighed 52 kg. But this is not the case for all athletes, and in some sports, a lean body type would put them at a competitive advantage. Lean sports refer to categories of sports that put a competitive or attractive value on being lean/thin. These athletes are often able to perform better and compete at higher levels if they meet the certain lean body type. Such sports include gymnastics, running, volleyball, soccer, swimming, diving, and dance. In contrast, non-lean sports include football, basketball, and rugby.

Carter & Rudd (2005) had approximately 800 varsity student athletes at Ohio State University complete the *Questionnaire for Eating Disorder Diagnosis* (Mintz et al., 1997) in 2001 and 2002. Eight questions were added in 2002 to specifically address men's eating behaviours. The sports were divided into those that traditionally have a high risk for eating disorders (lean sports) and those with a low risk (non-lean sports). The lean sports included cheerleading, cross country/track and field, swimming, and volleyball. The non-lean sports included: basketball, golf, soccer, and softball. Results found that subclinical eating problems were more prevalent than clinical eating disorders in athletes, with higher incidence reported for females in both groups; 19% of female athletes, and 12% of male athletes reported eating disorder symptoms in the first year of data collection, and 17% of females and 9% of males in the second year. In 2002, 1% of

male athletes were found to fit the diagnosis of muscle dysmorphia. Significant differences were found between lean and non-lean sports on measures of social pressure on body shape and team trust. Across both years, athletes from lean sports reported significantly more eating disorder symptoms than athletes from non-lean sports. The authors also found evidence that the primary influence of eating disorders in female athletes came from external social pressures.

Similarly, Reinking & Alexander, (2005) surveyed undergraduate females, including 84 collegiate athletes and 62 non-athletes, and found female athletes to exhibit the highest body dissatisfaction. Lean-sport female athletes also had a lower desired body weight. Together with the results of Carter and Rudd (2005), these findings suggest females from lean sports may be at the highest risk for disordered eating behaviours.

Level of Competition and Eating Disorders

Level of competition refers to how much athletic experience an individual has, as well as what division or league an athlete is in. Recreational sports are typically less competitive, and people often participate just for fun or fitness. Intermediate level sports are moderately competitive, and individuals belonging to these teams typically have some previous athletic experience. Competitive level sports are for the most experienced and skilled athletes and tend to be the most time-consuming and have more focus and pressures on positive outcomes (i.e., winning). There are also various leagues that sports teams belong to that affect level of competition. For example, Mount Allison University has sports teams that belong to the Atlantic University Sport league (AUS), which is part of U-Sport, the most competitive level of scholastic athletics in Canada; other teams belong to the Atlantic Collegiate Athletic Association (ACAA), generally considered to

be a less competitive league. And some teams at Mount Allison are considered club teams, competing in leagues a tier below the ACAA, and can be considered the least competitive with the least time commitment demands.

The level of athletic participation has also been investigated as a potential risk factor for developing an eating disorder. Holm-Denoma et al. (2009) investigated eating disorder symptoms among undergraduate varsity athletes, club athletes, independent exercisers, and non-exercisers. The 274 female participants completed a survey that measured their exercise habits, eating disorder symptomatology and sport anxiety. The results found that women who participated in sports tended to have higher levels of eating disorder symptomatology compared to those who did not participate in sports. The interaction of sports anxiety and level of athletic participation significantly predicted body dissatisfaction and symptoms of bulimia, marked by repeated episodes of eating abnormally large amounts of food with feeling a loss of control during bingeing. Those participating at higher competitive levels and experiencing more sports anxiety were at highest risk. This coincides with earlier research. Picard (1999) examined eating attitudes among a sample of NCAA Division I and Division II female collegiate athletes, as well as non-athlete controls. Results indicated that athletes who participated in higher levels of competition showed more signs of pathological eating, and were at an increased risk of developing an eating disorder (Picard, 1999).

Perceived Social Support and Eating Disorders

Perceived social support refers to how individuals sense the availability of friends, family, and others to provide psychological or other forms of support in times of distress or need (Ozbay et al., 2007). Social networks are defined as the group of people whom

we interact with on a regular basis, which enables the development of our identity (Leonidas & dos Santos, 2014). In recent years, social support networks have garnered much attention as they are increasingly linked to better mental health and other positive life-outcomes, by potentially giving individuals a sense of belonging, acceptance, and self-worth (Harandi et al., 2017). University students who report having lower quality social support are more likely to experience mental health problems, including a sixfold risk of depression symptoms compared to students with high-quality social support (Hefner & Eisenberg, 2009). In athletic contexts, students face considerable pressure and stress that if not supported effectively by coaches, family, friends, etc., may progress to faulty outcomes (burnout, poor mental-health, retirement from sport; [Hefner & Eisenberg, 2009]).

Past research has found that social support and disordered eating attitudes and behaviours are negatively correlated to one another; such that as social support decreases, eating disorder attitudes and behaviours increases (Birmachu, 2018). A lack of social support has also been found to be a predisposing factor for the development of negative feelings about an individual's body. Such feelings tend to contribute to an individuals' belief that they could fit in or receive greater social acceptance if only they could lose weight (Limbert, 2010). Highlighting how experiences within social networks can be painful for individuals, critical and derogatory comments about body weight that come from parents or significant members of one's social network have been found to be principal factors in triggering eating disorders (Hutchinson & Rapee, 2007). As for individuals who suffer from eating disorders, they have been shown to perceive less

social support compared to people who do not suffer from eating disorders (Cusack & Hughes, 2014).

Studies focused on athletes' well-being may serve a preventative function in fostering a better understanding of how to prevent such ill-effects. Such studies have emphasized the role that athletic departments, coaches, and teammates play in preserving the well-being of athletes (Scott et al., 2022). Bissett et al., 2020 reviewed the literature about the role that sport coaches play in the prevention/promotion of mental health. Using an established approach to answering a research question through reaching a consensus view across experts, and through exploration and evaluation phases, researchers evaluated twenty-one articles from PubMed, PsycINFO, and ProQuest published by prominent sport organizations. These studies focused on the role of coaches as they relate to culture setting in sport, addressing athlete mental health, and providing ongoing support to athletes with mental health concerns. Results found that it is beneficial if the coach's role includes fostering team cultures that support athlete mental health, encouraging care-seeking when necessary, and supporting athletes who are currently receiving mental healthcare (Bissett et al., 2020).

Coaching style impact on athletes' vulnerability for eating problems has been researched. Biesecker and Martz (1999) conducted an observational study that placed 110 college students into randomly assigned vignette conditions. The negative vignette portrayed a coach who was performance centered and focused on weight in a threatening manner. The positive vignette portrayed a coach who was focused on weight but in a humane and caring manner. Results indicated that participants exposed to the negative vignette reported having higher frequencies of dieting intentions, body image anxiety and

fear of becoming fat. These results suggest that coaching style can create an increased vulnerability for body image and eating problems in student-athletes, highlighting the role that coaches play in athlete well-being and mental health (Biesecker & Martz, 1999).

Healthy relationships among athletes and their coaches may contribute to a lessened risk of eating disorders among student-athletes (Van et al., 2012). A sample of student athletes from two universities completed the Eating Attitudes Test (EAT-26; Garner et al., 1982) and the Sick Control One Fat Food (SCOFF) questionnaire (Morgan et al., 2000). Results from the SCOFF suggested that much of the sample struggled with body image or food (Van et al., 2012). Nonetheless, results indicated that most participants did not feel pressure from their coaches to lose weight, suggesting that healthy relationships between student-athletes and people in their social networks may lessen the risk of eating disorders among athletes.

The Current Study

The objective of the current study was to identify the prevalence of eating disorder behaviour in the student-athlete population in the context of a small Canadian university. Improvements over past research include considering eating-disorder behaviours rather than actual diagnosis, while considering gender, level of competition, type of sport and perceived social support within a single study. Building from past literature, the proposed study also included a measure created to specifically identify eating disorder behaviours in male athletes, because their symptoms are often different from those of females.

The present study was designed to address four primary research questions. The first question pertained to whether there are gender differences among student-athletes

concerning eating disorder behaviours. It was hypothesized that participants who identify as female would show increased signs of eating disorder behaviours compared to those who identify as male. It was also hypothesized that males would show higher rates of bigorexia than females.

The second research question looked at across-sport differences, specifically, how do participants across sports vary in their eating habits/body image. It was hypothesized that eating disorder behaviours would be more pervasive among those who participate in lean sports compared to those in non-lean sports. Secondly, it was hypothesized that males belonging to non-lean sports teams would exhibit more signs of bigorexia, compared to males that belong to lean sports teams.

The third research question concerned the level of competition. Specifically, is competing on a varsity team related to an increased risk of eating disorder behaviours relative to club sport? To address this question, both varsity and club-sport athletes were invited to participate in the study. It was hypothesized that athletes who participate in varsity sports would exhibit more eating disorder behaviours compared to athletes at the club level.

Finally, the fourth research question pertained to whether perceived social support is related to eating disorder behaviour. It was hypothesized that higher perceived social support would be related to lower reported incidence of eating disorder behaviours.

Methods

Participants

There were 222 participants who responded to the survey, but after data clean-up (see below), the analyses included 200 participants. One-hundred and thirty participants

identified as female and 70 identified as male. Four participants identified as non-binary and one participant did not report their gender; these cases were excluded from analysis due to the low sample size for these responses. Pro-rating procedures were used to compute scale totals, which thereby removing participants who failed to complete less than 80% of the questions. Table 1 presents the frequency of varsity, club, lean-sport, and non-lean sport athletes.

Table 1

Participant Demographics: Level of Competition and Sport-type

| | Lean | Non-lean | Total |
|---------|------|----------|-------|
| Varsity | 80 | 52 | 132 |
| Club | 49 | 19 | 68 |
| Total | 129 | 71 | 200 |

To participate in the study, individuals had to compete on one of the university's athletic sports teams at either the varsity or club level. Those who had graduated or were not currently on a team (but had been in the past) were not allowed to participate. Participants were recruited via social media, posters displayed throughout the athletic centre and via email from the office of the athletic director. Informed consent was given by the student-athletes prior to completion of the survey and participation was voluntary. Participants could withdraw at any time. Participants had the option to either receive a 0.5% course credit through SONA (if they were an introductory psychology student) or they could provide their email address to be entered for the chance to win one of two \$50 gift cards to an athletic clothing store.

Materials

The participants accessed the survey through the online platform Lime Survey. The beginning of the survey included four demographic questions. The first question asked what gender each participant identified with. The second question asked which sex participants were assigned at birth. The third question asked participants which level of competition they participated in (Group 1: Varsity or Group 2: Club). The fourth question addressed which type of sport the participants belonged to. To maintain confidentiality, the participants were asked to respond whether they belonged to one of two groups; Group A represented the lean sport categories at the university (swimming, cross-country, dance, soccer, volleyball, field hockey, badminton or frisbee). Group B consisted of the non-lean sport teams (basketball, football, rugby, and lacrosse).

All participants completed the Eating Attitudes Test (EAT-26; Garner et al., 1982) which poses questions that fall into four categories: distorted body image, body weight, bulimic behaviour, and self-control. Notably, the participants did not complete the Body Mass Index (BMI) section of this test, as it is an outdated practice and of limited utility (De Lorenzo et al., 2013; Provencher et al., 2018). Questions included “I find myself preoccupied with food,” “I am occupied with a desire to be thinner” or “I like my stomach to be empty”; \ [have you] “ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?”; “lost 20 pounds or more in the last six months?”. Participants rated each question via a six-point Likert scale from Always (3) to Never (0) and question 26 was reverse-coded. Scores above 20 indicated a high level of concern over dieting, body weight or problematic behaviours. The EAT-26 has been found to

have a Cronbach's alpha of .85 (Sivero et al., 2005), making it a highly reliable tool in assessing eating disorder behaviour.

Many of the current measures used to assess eating disorders lack sensitivity in capturing disordered eating focused on muscularity, and commonly found in men. Therefore, all participants completed the Adonis Complex Questionnaire (Pope et al., 2000) that assessed the ways in which body image may affect a person's life while indicating the degree of muscle dysmorphia/bigorexia. The questionnaire contained 13 items; examples of questions include "Have you ever taken any type of drug—legal or illegal—to gain muscle, lose weight or otherwise improve your appearance?", and "How often have you used more extreme measures (other than drug use) to change your appearance, such as excessive exercising, working out even when injured", "fasting or other unhealthy dietary activities" "vomiting, use of laxative or other purging: methods", or "unconventional techniques for muscle development, hair growth, penile enlargement, etc.?" Participants were given 0 points for each question answered 'a,' 1 point for each question answered 'b' and 3 points for each question answered 'c.' The answers 'a,' 'b,' and 'c' varied depending on the question. Examples of these answers included "a) less than 30 minutes, b) 30-60 minutes, c) more than 60 minutes" or "a) rarely or not at all, b) sometimes, c) frequently." Total scores ranged from 0 to 39, with scores above 20 indicating a serious risk of the Adonis complex.

All participants also completed the Mount Allison Multidimensional Scale of Perceived Social Support, a 12-item questionnaire adapted for this study from the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988). The questionnaire assessed participants' perceived social support in relation to their family

and teammates and friends, along with their athletic department. The questions from the Multidimensional Scale of perceived Social Support (Zimet et al., 1988) which rated perceived social support from a significant other were removed and replaced with similar questions rating social support from their athletic department. Statements included “I can count on my friends and teammates when things go wrong” or “There are people in the athletic department (coaches, staff) with whom I can share my joys and sorrows.” Questions that rated support from friends were reworded to include teammates. Statements were rated from 1 (Very Strongly Disagree) to 7 (Very Strongly Agree). To calculate a total score, scores were summed across all 12 items and then divided by 12. Higher scores on the scale reflected higher levels of perceived social support.

Procedure

The participants accessed the survey from the online survey platform, Lime Survey. The questionnaire was estimated to take 15 minutes to complete. Upon completion, the participants were debriefed, and informed about resources, such as information to clinicians specializing in eating disorders, or services available in the province of New Brunswick that were accessible to participants if they felt any sort of discomfort.

Results

The second portion of the EAT-26 consisted of four eating disorder behavioural questions. These questions are meant to evaluate the prevalence of certain behaviours among participants and have been designed to identify whether individuals should seek evaluation from a trained professional. The questions asked participants if they had done any of the following in the past six months: “1) Gone on eating binges where you feel

that you may not be able to stop,” “2) Ever made yourself sick (vomited) to control your weight or shape,” “3) Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape,” and “4) Exercised more than 60 minutes a day to lose or to control your weight.” Table 2 depicts the percentage of participants who were considered to meet concerning levels of these behaviours, defined by answering “yes” to having engaged in any one of these behaviours within the last six months.

Table 2

Percentage of Eating Disorder Behaviours in the Last Six Months by Sport-type and Gender

| | Female (N = 118) | | Male (N = 66) | |
|-----------|------------------|--------------|---------------|--------------|
| | Lean (%) | Non-Lean (%) | Lean (%) | Non-Lean (%) |
| Binging | 11.86 | 5.10 | 7.94 | 6.35 |
| Vomiting | 11.02 | 3.40 | 1.50 | 1.50 |
| Laxatives | 6.80 | 0.84 | 0 | 0 |
| Exercise | 0 | 0 | 0 | 0 |

The EAT-26 specified that overall scale scores of 20 or above indicate a high level of concern about dieting, body weight or problematic eating behaviours. The authors of the EAT-26 recommend that those who score above 20 seek an evaluation from a qualified health professional. Likewise, the authors of the ACQ denote that scores between zero and nine represent minor body concerns, scores of 10-19 are indicative of mild to moderate forms of the Adonis complex, scores of 20-29 represent a serious problem with the Adonis complex and scores of 30-39 represent undoubtedly serious problems with the Adonis complex. The authors note that individuals who score above 20

are strongly recommended to consider treatment options. Table 3 demonstrates the percentages of participants whose scores reflect levels of concern as indicated by the authors of the EAT-26 (Garner et al., 1982) and ACQ (Pope et al., 2000).

Table 3

Percentage of Participants with Concerning Results on Questionnaires

| | Female | | Males | |
|----------|----------|--------------|----------|--------------|
| | Lean (%) | Non-lean (%) | Lean (%) | Non-lean (%) |
| EAT-26 | 18.18 | 4.13 | 6.15 | 6.15 |
| <i>N</i> | 121 | | 65 | |
| ACQ | 5.50 | 0 | 1.78 | 3.57 |
| <i>N</i> | 109 | | 56 | |

Note. Percentages represent those who scored above 20 on the specified measure.

Gender Differences in Eating Behaviour

The first hypothesis of the present study was that female athletes would show increased signs of eating disorder behaviours compared to male athletes, as measured via the EAT-26; and secondly, that male athletes would show higher rates of bigorexia/Adonis complex as measured by the ACQ. To test the first part of the hypothesis, a one-way analysis of variance was carried out. The results indicated that female athletes ($N = 122$, $M = 11.62$, $SD = 10.69$) scored significantly higher on the EAT-26 compared to male athletes ($N = 65$, $M = 8.95$, $SD = 9.16$), with a small effect size: $F(1, 185) = 2.913$, $p = .045$ (one-tailed), $\eta_p^2 = .016$. To test the second part of this research question, a one-way analysis of variance was carried out to test whether males exhibited higher rates of bigorexic behaviour when compared to females. The results indicated that males ($N = 56$, $M = 6.86$, $SD = 6.10$) did not exhibit more signs of

bigorexia when compared to females ($N = 110$, $M = 7.94$, $SD = 6.17$), $F(1, 164) = 1.27$, $p = .262$.

Lean vs Non-Lean Sport Differences

The second research question aimed to address eating disorder behaviour differences between sport types. It was hypothesized that athletes who competed on lean-sport teams would convey increased levels of eating disorder behaviours compared to athletes who competed on non-lean sport teams. To test the hypothesis, a one-way-analysis of variance was conducted to compare EAT-26 scores of the different sport classifications. The Levene's Test of unequal variances was significant ($p = .006$); hence an independent samples t-test was used with equal variances not assumed. The independent samples t-test revealed that lean-sport athletes ($N = 122$, $M = 11.63$, $SD = 11.40$) scored significantly higher on the EAT-26 compared to non-lean-sport athletes ($N = 65$, $M = 8.93$, $SD = 7.35$), $t(178) = 1.96$, $p = .013$ (one-tailed), Cohen's $d = 0.28$, indicating that lean-sport athletes exhibited more eating disorder behaviours and attitudes compared to non-lean-sport athletes with a small effect size. Secondly, it was hypothesized that male non-lean sport athletes would show increased behaviours consistent with the Adonis complex compared to lean-sport athletes. An independent samples t-test revealed that lean-sport male athletes ($N = 30$, $M = 4.88$, $SD = 5.45$) scored significantly lower than non-lean sport male athletes ($N = 26$, $M = 9.03$, $SD = 6.09$), $t(50.67) = -2.67$, $p = .01$ (equal variances not assumed), Cohen's $d = 0.72$, indicating a large effect size.

Varsity vs. Club Sport Differences

The third research question aimed to examine the differences in eating behaviours between varsity and club athletes. It was hypothesized that those who participate in varsity sports would exhibit more eating disorder behaviours compared to those in club sports. To address this, an independent samples t-test (equal variances not assumed) was used (as Levene's Test was significant, $p = .006$). The analysis revealed that club athletes ($N = 64$, $M = 13.26$, $SD = 11.76$) scored significantly higher on the EAT-26 compared to varsity athletes ($N = 123$, $M = 9.35$, $SD = 9.12$), $t(103) = -2.32$, $p = .022$, Cohen's $d = 0.37$, indicating a small effect size. These results refuted the hypothesis and found that club-athletes exhibited more eating disorder behaviours and attitudes compared to varsity athletes.

Perceived Social Support and Eating Behaviours

The fourth research question aimed to address levels of perceived social support among student-athletes, in relation to eating disorder behaviours. It was hypothesized that higher perceived social support would be related to a lower incidence of eating disorder behaviours. To address this question, pairwise correlations were calculated between scores on the EAT-26, the ACQ and the Mount Allison Multidimensional Scale of Perceived Social Support (MAMPSS), as well as with each cluster of items from this measure (athletic department support, family support, friend/teammate support). Table 4 presents an overview of the correlational results.

As evidenced in the table, there was a moderate negative relationship between the EAT-26 and the MAMPSS, indicating that as perceived social support decreased, eating disorder behaviours and attitudes increased. A moderate negative relationship was also

found to exist between the MAMPSS and ACQ, indicating that as perceived social support decreased, behaviours or attitudes consistent with the Adonis complex were found to increase. The relationship between the EAT-26 and the ACQ was found to be a moderate positive relationship, such that as scores on the EAT-26 increased, so did the scores on the ACQ. The relationship between the MAMPSS and the other sub-scales were found to have a positive moderate to high relationship, indicating that as perceived social support on the overall test increased, the social support scores on the other sub-scales also increased. The sub-scales were intercorrelated, indicating that as perceived social support scores increased on one scale, the scores on the other sub-scales also increased.

Table 4

Correlations Between Eating Disorder Behaviours and Perceived Social Support

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---------------|---|---------|----------|----------|----------|----------|
| EAT-26 (1) | | .694*** | -.353*** | -.265*** | -.330*** | -.216** |
| ACQ (2) | | | -.481*** | -.393*** | -.474*** | -.302*** |
| MAMPSS (3) | | | | .888*** | .706*** | .747*** |
| MAMPSSAD (4) | | | | | .532*** | .456*** |
| MAMPSSFAM (5) | | | | | | .397*** |
| MAMPSSFRI (6) | | | | | | |

Note. $p < .05^*$; $p < .01^{**}$; $p < .001^{***}$

Note. MAMPSS refers to the Mount Allison Multidimensional Scale of Perceived Social Support, MAMPSSAD refers to the athletic department sub-scale, MAMPSSFAM refers to the family sub-scale and MAMPSSFRI refers to the friends and teammates sub-scale.

Finally, a hierarchical multiple regression tested whether perceived social support predicted eating behaviours when all other factors of gender, sport type and level of competition were also considered. In the first step of the regression, gender, sport type and level of competition were entered together. Step two of the regression included the addition of the MAMPSS total score. The regression is summarized in Table 5.

The first step, that included gender, level, and type of sport, was shown to be significant and accounted for 4.8% of the variability in eating disorder behaviour as measured by the EAT-26. The full model that included perceived social support in step 2 was also significant and accounted for 15.1% of the variability in eating disorder behaviours as measured by the EAT-26, with perceived social support accounting for 10.3% of unique variance in eating behaviours. The full model shows that when holding all other variables constant, perceived social support was a strong predictor of eating disorder behaviours.

Table 5

Gender, Type of Sport, Level of Competition, and Perceived Social Support as Predictors of Eating Disorder Behaviours

| Criterion Order | β | R^2 | ΔR^2 | ΔF |
|-----------------|----------|-------|--------------|------------|
| Model 1 | | .048 | .048 | 2.736* |
| Gender | -1.690 | | | |
| Type of sport | 3.660* | | | |
| Level of sport | -1.019 | | | |
| Model 2 | | .151 | .103 | 19.549*** |
| Gender | -1.216 | | | |
| Type of sport | 2.912 | | | |
| Level of sport | -.402 | | | |
| MAMPSS | -.262*** | | | |

Note. $p < .05^*$; $p < .001^{***}$

Discussion

The objective of the current study was to identify and describe the prevalence of eating disorder behaviour within a small Canadian student-athlete population.

Improvements over past research included considering eating-disorder behaviours rather than actual diagnosis, while considering gender, level of competition, type of sport and perceived social support within a single study. Building upon previous research on this subject, the present study also incorporated a measure created to specifically identify eating disorder behaviours in male athletes, because their symptoms are often different from those of females. The present study used the Eating Attitudes Test-26 (Garner et al.,

1982) as well as the Adonis Complex Questionnaire (Pope et al., 2000) to measure eating disorder behaviours.

The present study aimed to address four primary research questions and six hypotheses. The first hypothesis was that female athletes would show more eating disorder behaviours compared to male athletes and this was supported as female athletes scored higher on the EAT-26 compared to male athletes. Secondly, it was hypothesized that males would exhibit more rates of bigorexia as measured by the ACQ. Surprisingly, this was not the case, as there were no significant differences between how male and female athletes scored on this measure. Thirdly, it was hypothesized that lean-sport athletes would exhibit more eating disorder behaviours compared to non-lean sport athlete sport athletes, and this was confirmed. The fourth hypothesis was that males belonging to non-lean sport teams would exhibit higher frequencies of bigorexic behaviour (when compared to lean-sport male athletes), as measured by the ACQ. The results supported this hypothesis as male athletes in the non-lean sport category scored significantly higher on the ACQ compared to lean-sport male athletes. Based on past research, it was then hypothesized that varsity athletes would exhibit more eating disorder behaviours compared to club sport athletes. While the results revealed a difference between club and varsity athletes, the direction of this difference was the opposite, with club sport athletes exhibiting significantly more eating disorder behaviours than to varsity athletes. The sixth and final hypothesis was that increased social support would be related to fewer eating disorder behaviours. This was confirmed. A multiple regression further revealed that perceived social support accounted for unique variances

in eating disorder behaviour even when gender, type of sport and level of competition were also considered.

Gender Differences in Eating Behaviours and the Adonis Complex

Gender differences in eating disorder prevalence have been found to exist (Byrne & McLean, 2001; Bratland-Sanda & Sundgot-Borgen, 2013). Specific to the athletic community, female athletes are often considered to be at a higher risk of suffering from an eating disorder when compared to their male counterparts (Byrne & McLean, 2001; Bratland-Sanda & Sundgot-Borgen, 2013). This finding was also confirmed in the present study as female athletes scored significantly higher than male athletes on the EAT-26. Our study can contribute to the growing literature on this subject and extend findings to a small university context. Krebs et al. (2019), investigated eating disorder risk among National Collegiate Athletic Association (NCAA) Division 1 cross-country and track distance runners. Based on completion of the Eating Disorder Screen for Primary Care (ESP; Cotton et al., 2003), females were found to be screened at higher rates for potential eating disorders than males, with rates of 45.95% for females, and 13.66% for males. When a more stringent criteria was used, females were still at a higher risk at 21.69% +/- 2.50, while 4.6% +/- 1.10 of males were of similar risk. These findings are comparable to those of the present study which found that 18.18% of female lean-sport athletes scored at high levels (above 20 on the EAT-26) indicating concerning scores of eating disorder behaviour, compared to 6.15% of lean-sport male athletes.

Within the eating disorder literature, measures used in assessment have largely reflected symptomology that is more female-centric. In recent years, clinicians have found evidence for 'bigorexia' (also known as the Adonis complex) among men with

parallels to eating disorders (Murray et al., 2010). Individuals who suffer from this disorder engage in obsessive behaviour such as devoting many hours to the gym weightlifting, spending excessive amounts of money on sports equipment and protein supplements, adopting abnormal diet patterns and abusing anabolic substances (Yeloğlu, 2018). Although it is thought to mainly affect men, research on prevalence is limited; past research has estimated its prevalence at 2.2% among men (Mitchison et al., 2021). The present study investigated whether the prevalence is indeed higher in men, compared to women, and found no significant differences in how these groups scored on the Adonis Complex Questionnaire. The authors indicated that scores above 20 on the scale suggested clinical concern for the Adonis complex/bigorexia. Surprisingly, 5.50% of lean-sport female athletes scored above 20, suggesting that this disorder may not be uniquely found among men or be exclusive to non-lean sports. In the present study, no female non-lean athletes scored above 20, while 3.57% of non-lean sport male athletes did. These findings for male athletes are similar to past estimates of the disorder (Mitchinson et al., 2021). However, few studies have examined its prevalence among female athletes; the present study is able to provide insight on this disorder and evidence that it may not be limited to males and non-lean sports only. Perhaps female lean-sport athletes also showed concern on this test because some of the questions were aimed to address general distress with body-image. For example, “how often are you distressed by your appearance concerns”, “how often do you avoid having all or part of your body seen by others”, “how often have you avoided being seen by others because of your appearance concerns?”. These questions are general and do not specify whether an individual avoids certain situations because they believe they are inadequately

muscular/are not big enough. Instead, these questions address general distress with body image, which may be interpreted differently by females and males. Hence this is why female lean-sport athletes were also found to score high on this test, with no significant overall differences observed between males and females on this measure.

Lean vs. Non-Lean Sport Differences

The type of sport an athlete competes in might also play a role in whether they are at an increased risk of developing an eating disorder. Carter & Rudd (2005) found that subclinical eating problems were more prevalent than clinical eating disorders in athletes, with higher incidences reported for females in both lean-sport and non-lean sport groups. Athletes from lean sports reported significantly more eating disorder symptoms compared to those from non-lean sports. This finding was also confirmed by the present study. Comparison of scores across groups found that 18.18% of lean-sport female athletes had scores greater than 20 on the EAT-26, while 4.13% of non-lean-sport female athletes also fit into this category of concern. In contrast the percentage of males scoring in this range was the same across all levels of competition (6.15% of lean-sport male athletes and non-lean-sport athletes scored higher than 20 on the EAT-26). These results suggest that differences may exist between how lean-sport and non-lean-sport athletes interact with food and exercise, especially for females.

In the present study, differences in how males scored on the Adonis Complex Questionnaire across sport type was also examined. Past research has shown that male athletes who belong to non-lean sports differ in their body-image concerns and may be at higher risk of developing the Adonis complex (Olivardia et al., 2000). This was observed in the present study, as males in non-lean sports scored significantly higher than those in

lean sports, with a very large effect size. To date, limited research has been reported on male-centered eating and body dysmorphia disorders. Through use of the ACQ, the present study can provide further evidence that the way men experience eating, and body dysmorphia disorders may be unique and depend on various factors, including their sport team.

Varsity vs. Club Sport Differences

Regarding the level of competition and its relationship to eating disorder behaviour, Holem-Denoma et al. (2009) reported those participating at higher competitive levels were at highest risk. This coincides with earlier research (Picard, 1999). However, the present study found the opposite: there was a higher incidence of eating disorder behaviour reported among our club level athletes relative to the presumed more competitive varsity team participants. It should be noted that because our population pool was much smaller than that of larger athletic or university institutions, we did not ask participants to reveal which specific team they were a member (to protect confidentiality). Participants were instead asked to disclose which groups they belonged to (club or varsity; lean-sport or non-lean-sport). In the context of the university where this research was conducted, many of the club teams also fell into the lean-sport category. Dance, cross-country, field-hockey and frisbee are all club sports at this institution, and they also belong to the lean-sport category. Past research has indicated that dance has some of the highest rates of eating disorders among all other sports (Arcelus et al., 2014) and its inclusion as a club sport may have influenced the results of the present study. Had we been able to ask participants which sports teams they

belonged to, instead of grouping by category, our results may have been able to more accurately evaluate this possibility.

Perceived Social Support and Eating Disorder Behaviour

Lastly, perceived social support and its relationship to eating disorders was examined. Birmachu (2018) found a negative correlation between disordered eating attitudes, behaviours, and social support. Individuals who suffer from eating disorders have been shown to perceive less social support compared to people who do not suffer from eating disorders (Cusack & Hughes, 2014). The present study investigated perceived social support from family, athletic department, and teammates/friends, and how it relates to eating disorder behaviour. Using pairwise correlations, a negative relationship was found to exist, suggesting that as perceived social support decreased, eating disorder behaviour increased. We were also able to provide evidence for the relationship between eating disorder behaviour and different types of social support. For example, a small negative correlation was found to exist between perceived social support from within the athletic department and eating behaviours. Few studies have examined the different types of communities that provide social support to athletes and how strongly athletes rate the perceived support. This study specifically evaluated perceived social support from varying sources, providing new information on the importance of social support in athlete well-being. Specifically, the present results speak to the importance of support from within the athletic department and from coaches and teammates. Furthermore, a hierarchical multiple regression analysis revealed that perceived social support contributed unique variances in eating behaviours, when controlling for all other variables (gender, type of sport and level of competition).

Limitations

A possible limitation to the current findings is how data was obtained. The methods in which we measured eating disorder behaviour was done through a self-report survey. Some participants may have distorted their responses to appear less (or more) severe than they really were. Because eating disorders are often an evasive subject, participants may not have been fully aware of the extent of their attitudes and behaviour towards eating. Given the nature of the subject, this is nonetheless the most frequently used method of data collection, which is considered to be a valid reflection of behaviours. Although sports teams often meet with nutritionists or review eating habits with members of their team (coaches or teammates), discussions around eating disorders in athletic contests are limited or typically non-existent. However, these conversations can be lifesaving. Oftentimes, individuals may not even know they are suffering from an eating disorder until it is pointed out by another. A second limitation to the current findings is that athletes were aware of the nature of this research and were informed about what we were studying prior to participation. Participation in this study was completely voluntary. This may have provoked specific individuals to participate in the research, and discouraged those who were uninterested in the topic from completing the survey. Although this could change the percentage and overall number of participants' concerning results, it is unlikely that the trends in eating disorder behaviour by gender, sport type and level of competition would have been different.

Implications and Recommendations

Overall, the present study provides evidence that eating disorder behaviour may exist within Canadian university athletic communities, even at smaller schools. This

study provides evidence that gender and sport differences may exist in athletes' vulnerability for eating disorders. The ways in which men may differ in their eating behaviour based on which category of sport they play was also revealed through this work. The present study also highlights the importance of strong social support networks to encourage athlete well-being and positive health outcomes. These results suggest that athletes are susceptible to negative mental-health outcomes, and that better support systems are warranted to protect them from the harmful effects of eating disorders, and to support those who may already be struggling.

Of note, this study contributes to the importance of efforts to increase awareness within athletic departments and coaching staff that could help with the identification and support of affected athletes. Such awareness includes knowledge of how one's own behaviours and language can impact others. For example, practices such as labeling food (such as sugar or carbohydrates) as being "bad" or encouraging athletes to engage differently with food (i.e., encouraging dieting) are not recommended without the input of a qualified nutritionist or health practitioner. Coaches can acknowledge the importance of athletes fuelling their bodies, and the negative health outcomes that restrictive eating can bring, yet they can balance focus on eating with emphasis on hard work, drive, and discipline to avoid increasing negative body image. Just as coaches receive professional education centred around other areas (including [recently] sexual violence and substance use), they may benefit from increased training around eating behaviours, body image, and mental health. Finally, universities can integrate student resources within athletics to ensure that athletics are a positive activity for those who participate.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Press.
- Arcelus, J., Witcomb, G. L., & Mitchell, A. (2014). Prevalence of Eating Disorders amongst Dancers: A Systemic Review and Meta-Analysis. *European Eating Disorders Review*, 22(2), 92–101. <https://doi.org/10.1002/erv.2271>
- Biesecker, A. C., & Martz, D. M. (1999). Impact of coaching style on vulnerability for eating disorders: An analog study. *Eating Disorders: The Journal of Treatment & Prevention*, 7(3), 235–244. <https://doi.org/10.1080/10640269908249289>
- Birmachu, A. M. (2018). *Eating disorder attitudes and behaviors, perceived social support, and rumination in university students* [Thesis, University of Wisconsin--Stout]. <https://minds.wisconsin.edu/handle/1793/79752>
- Bissett, J. E., Kroshus, E., & Hebard, S. (2020). Determining the role of sport coaches in promoting athlete mental health: A narrative review and Delphi approach. *BMJ Open Sport & Exercise Medicine*, 6(1), e000676. <https://doi.org/10.1136/bmjsem-2019-000676>
- Bratland-Sanda, S., & Sundgot-Borgen, J. (2013). Eating disorders in athletes: Overview of prevalence, risk factors and recommendations for prevention and treatment. *European Journal of Sport Science*, 13(5), 499–508. <https://doi.org/10.1080/17461391.2012.740504>
- Byrne, S., & McLean, N. (2001). Eating disorders in athletes: A review of the literature. *Journal of Science and Medicine in Sport*, 4(2), 145–159. [https://doi.org/10.1016/S1440-2440\(01\)80025-6](https://doi.org/10.1016/S1440-2440(01)80025-6)

- Carter, J. E., & Rudd, N. A. (2005). Disordered Eating Assessment for College Student-Athletes: [1]. *Women in Sport & Physical Activity Journal*, *14*(1), 62–71.
- Cotton, M.-A., Ball, C., & Robinson, P. (2003). Four Simple Questions Can Help Screen for Eating Disorders. *Journal of General Internal Medicine*, *18*(1), 53–56.
<https://doi.org/10.1046/j.1525-1497.2003.20374.x>
- Cusack, C. E., & Hughes, J. L. (2014). Women with Eating Disorders and Perceived Social Support. *Undergraduate Research Journal for the Human Sciences*, *13*(1).
<https://www.kon.org/urc/v13/cusack.html>
- De Lorenzo, A., Bianchi, A., Maroni, P., Iannarelli, A., Di Daniele, N., Iacopino, L., & Di Renzo, L. (2013). Adiposity rather than BMI determines metabolic risk. *International Journal of Cardiology*, *166*(1), 111–117.
<https://doi.org/10.1016/j.ijcard.2011.10.006>
- Eisenberg, D., Nicklett, E. J., Roeder, K., & Kirz, N. E. (2011). Eating Disorder Symptoms Among College Students: Prevalence, Persistence, Correlates, and Treatment-Seeking. *Journal of American College Health*, *59*(8), 700–707.
<https://doi.org/10.1080/07448481.2010.546461>
- Galmiche, M., Déchelotte, P., Lambert, G., & Tavolacci, M. P. (2019). Prevalence of eating disorders over the 2000–2018 period: A systematic literature review. *The American Journal of Clinical Nutrition*, *109*(5), 1402–1413.
<https://doi.org/10.1093/ajcn/nqy342>
- Garner, D. M. (1991). *Eating disorder inventory-2: Professional manual*. Psychological Assessment Resources.

- Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The eating attitudes test: Psychometric features and clinical correlates. *Psychological Medicine, 12*(4), 871–878. <https://doi.org/10.1017/s0033291700049163>
- Harandi, T. F., Taghinasab, M. M., & Nayeri, T. D. (2017). The correlation of social support with mental health: A meta-analysis. *Electronic Physician, 9*(9), 5212–5222. <https://doi.org/10.19082/5212>
- Hefner, J., & Eisenberg, D. (2009). Social support and mental health among college students. *American Journal of Orthopsychiatry, 79*, 491–499. <https://doi.org/10.1037/a0016918>
- Holm-Denoma, J. M., Scaringi, V., Gordon, K. H., Van Orden, K. A., & Joiner Jr., T. E. (2009). Eating disorder symptoms among undergraduate varsity athletes, club athletes, independent exercisers, and nonexercisers. *International Journal of Eating Disorders, 42*(1), 47–53. <https://doi.org/10.1002/eat.20560>
- Hsu, L. K. G. (1989). The gender gap in eating disorders: Why are the eating disorders more common among women? *Clinical Psychology Review, 9*(3), 393–407. [https://doi.org/10.1016/0272-7358\(89\)90063-9](https://doi.org/10.1016/0272-7358(89)90063-9)
- Hutchinson, D. M., & Rapee, R. M. (2007). Do friends share similar body image and eating problems? The role of social networks and peer influences in early adolescence. *Behaviour Research and Therapy, 45*(7), 1557–1577. <https://doi.org/10.1016/j.brat.2006.11.007>
- Johnson, C., Powers, P. S., & Dick, R. (1999). Athletes and eating disorders: The national collegiate athletic association study. *International Journal of Eating Disorders, 25*(2), 157–167. <https://doi.org/10.1093/ijed/25.2.157>

26(2), 179–188. [https://doi.org/10.1002/\(SICI\)1098-108X\(199909\)26:2<179::AID-EAT7>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1098-108X(199909)26:2<179::AID-EAT7>3.0.CO;2-Z)

Kessler, R. C., Berglund, P. A., Chiu, W. T., Deitz, A. C., Hudson, J. I., Shahly, V., Aguilar-Gaxiola, S., Alonso, J., Angermeyer, M. C., Benjet, C., Bruffaerts, R., de Girolamo, G., de Graaf, R., Maria Haro, J., Kovess-Masfety, V., O'Neill, S., Posada-Villa, J., Sasu, C., Scott, K., ... Xavier, M. (2013). The prevalence and correlates of binge eating disorder in the World Health Organization World Mental Health Surveys. *Biological Psychiatry*, *73*(9), 904–914.

<https://doi.org/10.1016/j.biopsych.2012.11.020>

Krebs, P. A., Dennison, C. R., Kellar, L., & Lucas, J. (2019). Gender Differences in Eating Disorder Risk among NCAA Division I Cross Country and Track Student-Athletes. *Journal of Sports Medicine*, *2019*, 1–5.

<https://doi.org/10.1155/2019/5035871>

Leonidas, C., & dos Santos, M. A. (2014). Social support networks and eating disorders: An integrative review of the literature. *Neuropsychiatric Disease and Treatment*, *10*, 915–927. <https://doi.org/10.2147/NDT.S60735>

Limbert, C. (2010). Perceptions of Social Support and Eating Disorder Characteristics. *Health Care for Women International*, *31*(2), 170–178.

<https://doi.org/10.1080/07399330902893846>

Mintz, L., O'Halloran, M., Mulholland, A., & Schneider, P. (1997). Questionnaire for Eating Disorder Diagnoses: Reliability and Validity of Operationalizing DSM-IV Criteria into a Self-Report Format. *Journal of Counseling Psychology*, *44*, 63–79.

<https://doi.org/10.1037/0022-0167.44.1.63>

- Mitchison, D., Mond, J., Griffiths, S., Hay, P., Nagata, J. M., Bussey, K., Trompeter, N., Lonergan, A., & Murray, S. B. (2021). Prevalence of muscle dysmorphia in adolescents: Findings from the EveryBODY study. *Psychological Medicine*, 1–8. <https://doi.org/10.1017/S0033291720005206>
- Morgan, J. F., Reid, F., & Lacey, J. H. (2000). The SCOFF questionnaire. *Western Journal of Medicine*, 172(3), 164–165.
- Murray, S. B., Rieger, E., Touyz, S. W., & De la Garza García Lic, Y. (2010). Muscle dysmorphia and the DSM-V conundrum: Where does it belong? A review paper. *The International Journal of Eating Disorders*, 43(6), 483–491. <https://doi.org/10.1002/eat.20828>
- Olivardia, R., Pope, H. G., & Hudson, J. I. (2000). Muscle dysmorphia in male weightlifters: A case-control study. *The American Journal of Psychiatry*, 157(8), 1291–1296. <https://doi.org/10.1176/appi.ajp.157.8.1291>
- Otto, M. W., Wilhelm, S., Cohen, L. S., & Harlow, B. L. (2001). Prevalence of Body Dysmorphic Disorder in a Community Sample of Women. *American Journal of Psychiatry*, 158(12), 2061–2063. <https://doi.org/10.1176/appi.ajp.158.12.2061>
- Ozbay, F., Johnson, D. C., Dimoulas, E., Morgan, C. A., Charney, D., & Southwick, S. (2007). Social Support and Resilience to Stress. *Psychiatry (Edgmont)*, 4(5), 35–40.
- Picard, C. L. (1999). The Level of Competition as a Factor for the Development of Eating Disorders in Female Collegiate Athletes. *Journal of Youth and Adolescence*, 28(5), 583–594. <https://doi.org/10.1023/A:1021606710398>

- Pope, H. G., Pope, H., Phillips, K. A., & Olivardia, R. (2000). *The Adonis Complex: The Secret Crisis of Male Body Obsession*. Simon and Schuster.
- Provencher, M. T., Chahla, J., Sanchez, G., Cinque, M. E., Kennedy, N. I., Whalen, J., Price, M. D., Moatshe, G., & LaPrade, R. F. (2018). Body Mass Index Versus Body Fat Percentage in Prospective National Football League Athletes: Overestimation of Obesity Rate in Athletes at the National Football League Scouting Combine. *Journal of Strength and Conditioning Research*, 32(4), 1013–1019. <https://doi.org/10.1519/JSC.0000000000002449>
- Pustivšek, S., Hadžić, V., & Dervišević, E. (2015). Risk Factors for Eating Disorders Among Male Adolescent Athletes / Dejavniki Tveganja Motenj Hranjenja Med Športniki V Adolescenci. *Slovenian Journal of Public Health*, 54(1), 58–65. <https://doi.org/10.1515/sjph-2015-0008>
- Reinking, M. F., & Alexander, L. E. (2005). Prevalence of Disordered-Eating Behaviors in Undergraduate Female Collegiate Athletes and Nonathletes. *Journal of Athletic Training*, 40(1), 47–51.
- Rome, E. S., & Ammerman, S. (2003). Medical complications of eating disorders: An update. *Journal of Adolescent Health*, 33(6), 418–426. <https://doi.org/10.1016/j.jadohealth.2003.07.002>
- Rosenberg, M. (2006). *Rosenberg Self-Esteem Scale (RSE)*. 2.
- Sawyer, S. M., Whitelaw, M., Le Grange, D., Yeo, M., & Hughes, E. K. (2016). Physical and Psychological Morbidity in Adolescents With Atypical Anorexia Nervosa. *Pediatrics*, 137(4), e20154080. <https://doi.org/10.1542/peds.2015-4080>

- Scott, C. L., Haycraft, E., & Plateau, C. R. (2022). A prospective study of teammate factors on athletes' well-being, disordered eating, and compulsive exercise. *Sport, Exercise, and Performance Psychology, 11*(3), 290–304.
<https://doi.org/10.1037/spy0000293>
- Secord, P. F., & Jourard, S. M. (1953). The appraisal of body-cathexis: Body-cathexis and the self. *Journal of Consulting Psychology, 17*(5), 343–347.
<https://doi.org/10.1037/h0060689>
- Smink, F. R. E., van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of Eating Disorders: Incidence, Prevalence and Mortality Rates. *Current Psychiatry Reports, 14*(4), 406–414. <https://doi.org/10.1007/s11920-012-0282-y>
- Sundgot-Borgen, J., & Torstveit, M. K. (2004). Prevalence of Eating Disorders in Elite Athletes Is Higher Than in the General Population. *Clinical Journal of Sport Medicine, 14*(1), 25–32.
- Van, Z. Y., Surujlal, J., & Dhurup, M. (2012). Eating disorders among university student-athletes and physical activity. *African Journal for Physical Health Education, Recreation and Dance, 18*(2), 267–280. <https://doi.org/10.10520/EJC123252>
- Yeloğlu, Ç. H. (2018). Bigorexia: Diagnosis and treatment approaches. *Psychiatry and Clinical Psychopharmacology, 28*, 324.
- Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment, 52*, 30–41. https://doi.org/10.1207/s15327752jpa5201_2

Appendix A

Recruiting Materials

Social Media Post/Message

Hello everyone, my name is Thea Button, and I am an Honours Psychology Student working in the Mount Allison Sport Psychology Lab. I am no stranger to athletics as I swam for the varsity swim team for three years and was an athletic trainer for women's soccer the past two years! I am conducting my research on eating behaviours in student-athletes through Limesurvey.

The survey takes approximately 15-20 minutes to complete. All responses are confidential and nobody in athletics or my laboratory will be able to identify your responses.

Upon completion of the survey, you may enter your email address to a draw to win 1 of 2 \$50 Lululemon gift cards.

Thank you so much in advance for completing my survey 😊

Recruitment Sign



ARE YOU ON A SPORTS TEAM AT MTA?

**IF YOU ARE A VARSITY OR CLUB-TEAM ATHLETE:
CONSIDER PARTICIPATING IN A
SPORT'S PSYCHOLOGY
RESEARCH PROJECT
INVESTIGATING EATING
BEHAVIOUR IN STUDENT-
ATHLETES!**

PARTICIPANTS WILL BE ENTERED TO WIN A \$50 LULULEMON OR
BIOSTEEL GIFT CARD

[HTTPS://TINYURL.COM/MTA-EATING](https://tinyurl.com/MTA-EATING)

FOR ADDITIONAL INFO CONTACT TABUTTON@MTA.CA

Appendix B

Informed Consent Form

Thea Button is an honors student in psychology. She is conducting a study in the Mount Allison Sport Psychology Lab under the supervision of Dr. Gene Ouellette in the Department of Psychology at Mount Allison University. The purpose of this study is to identify the prevalence of eating disorder behavior in the student-athlete population. This will be done through examining gender-differences, sport-risks, level of competition and perceived social support.

You are invited to participate in an online survey. The survey includes questions about your thoughts and behaviors towards food and exercise. We expect this will take approximately 30 minutes to complete.

At the beginning of the survey, we will be asking what kind of sport-team category you fall into (Lean-Sport: swimming, dancing, running, volleyball, or Non-Lean-Sport: basketball, football, rugby, hockey, etc.). The purpose of this is for analysis, as we will be comparing the prevalence of eating-disorder behaviors between sport categories.

In return for your participation, you will be entered to win a \$50 lululemon gift card. You will have to provide your email in-order to be entered for the draw. If you do not wish to provide an email, you will not be entered in the draw, but you can still participate in the study.

The information gathered in this study will be kept confidential and we are using an online platform (LimeSurvey) that locally stores the data. Data will be stored on university servers and password-protected computers. Any publications related to this study will report unidentifiable characteristics of participants, and results will be presented as group statistics only with no individual information.

Your participation is completely voluntary. You may choose to answer only those questions that you feel comfortable answering. You may withdraw from this study at any time without penalty.

If you have any questions about this study, please contact Thea Button (tabutton@mta.ca) or Dr. Ouellette (gouellette@mta.ca).

This research has been reviewed and approved by the Mount Allison University Research Ethics Board. If you have any questions or concerns about this study, you may contact the Mount Allison University Research Ethics Board, by phone (506-364-2618) or by e-mail at reb@mta.ca.

If you agree to participate in this study, please click “Next”

Appendix C

Debrief Form Following the Study

Thank you for your participation in this study. It is people like you who make research possible by volunteering their time.

In this study, we are interested in the prevalence of eating-disorder behavior in student-athletes.

Eating disorders are serious mental-health conditions that are characterized by frequent disturbances in eating or lifestyle behaviors (such as compulsive exercise) that are associated with unsettling thoughts and emotions. Eating disorders are often accompanied with an obsession of appearance and/or weight, as well as anxiety to eat certain foods for fear of consequences that individuals have come to associate with certain foods. Research suggests that student-athletes are at an increased risk of suffering from eating-disorders compared to the general population.

Gender differences in disordered-eating behavior have been shown to exist, both in the general population as well as in athletic communities. The sociocultural pressure to be thin is something that may be experienced by all genders, but it is found to be more prevalent among women.

The type of sport an athlete competes in might also play a role in whether they are at an increased risk of developing an eating disorder. In some athletic contexts, athletes are projected to be at a competitive advantage if their body is lean in shape.

Level of competition refers to how much athletic experience an individual has, as well as what division or league an athlete is a part of. Past research has shown mixed results with some studies estimating less competitive athletes to be at a higher risk of developing an eating-disorder, while other studies suggest elite-athletes are at increased risks.

Perceived social support refers to how individuals sense the availability of friends, family, and others to provide them with psychological or other forms of support in times of distress or need. High levels of perceived social support have been linked to better mental-health outcomes and positive-life events.

We wanted to examine prevalence of eating-disorder behavior and look at the relationship between behavior, type of sport played, gender, level of competition and perceived social support.

All participants in this study completed the same questionnaires, but male athletes were asked to complete an additional survey because traditional research on eating disorders has lacked sensitivity in capturing disordered eating commonly found in men. Please note that all responses are treated as confidential, and in no case will responses from individual students be identified. Rather, all data will be pooled, and the results may be presented at research conferences and/or as articles. If you are interested in finding out the results of this study, we warmly invite you to the annual research day in psychology where some of the results from this project will be presented.

If you have questions or would like further information about this study, please email Thea Button (tabutton@mta.ca) or Dr. Ouellette (gouellette@mta.ca). This project has been reviewed and approved by Mount Allison's Research Ethics board. If you have any questions or concerns about this study, you may contact the Chair of the Mount Allison University Research Ethics Board by phone (1-506-364-2618) or by e-mail at reb@mta.ca.

If you experienced any kind of discomfort during our study, please reach out to the following resources available both on and off campus or email wellness@mta.ca :

Mental Health Services Available to Mta Students: <https://mta.ca/current-students/health-and-wellness/mental-health-and-wellness/mental-health-services>

Link to Therapists and Psychologists in New Brunswick who specialize in treating eating disorders: <https://www.psychologytoday.com/ca/therapists/new-brunswick?category=eating-disorders>

Hotline for Eating Disorder Support in New Brunswick: <https://nb.211.ca/record-detail/73333592/?alt=1>

Mental health resources available to Canadian Athletes: <https://www.ccmhs-ccsms.ca/>

National Eating Disorder Information centre: <https://nedic.ca/>

Appendix D

Demographic Questions

Please tell us a little bit about yourself.

What is your gender?

- Male
- Female
- Non-binary
- Other: _____
- Prefer not to say

What sex were you assigned at birth?

- Male
- Female
- Intersex
- Prefer not to say

Which level of sport do you compete in at the university?

- Varsity (swimming, soccer, football, basketball, hockey, badminton, volleyball)
- Club

Which group of teams are you a part of?

- Group A (swimming, cross-country, dance, soccer, volleyball, field hockey, badminton, frisbee)
- Group B (basketball, football, rugby, hockey, lacrosse)

If you are an Intro to Psychology student doing this for SONA credit, please email me at tabutton@mta.ca to be entered manually.

Appendix E

Eating Attitudes Test (EAT-26)

Garner et al., 1982

This screening measure is not designed to make a diagnosis of an eating disorder or take the place of a professional consultation. Please fill out the form below as accurately, honestly, and completely as possible. There are no right or wrong answers. All of your responses are confidential.

Check a response for each of the following questions:

| | Always | Usually | Often | Sometimes | Rarely | Never | No answer |
|---|--------|---------|-------|-----------|--------|-------|-----------|
| I am terrified about being overweight | | | | | | | |
| I avoid eating when I am hungry | | | | | | | |
| I find myself preoccupied by food | | | | | | | |
| I have gone on eating binges where I feel that I may not be able to stop | | | | | | | |
| I cut my food into small pieces | | | | | | | |
| I am aware of the calorie content of foods that I eat | | | | | | | |
| I particularly avoid food with a high carbohydrate content (i.e., bread, rice, potatoes, etc.) | | | | | | | |
| I feel that others would prefer if I ate more | | | | | | | |
| I vomit after I have eaten | | | | | | | |
| I feel extremely guilty after eating | | | | | | | |
| I am preoccupied with a desire to be thinner | | | | | | | |
| I think about burning calories when I exercise | | | | | | | |
| Other people think that I am too thin | | | | | | | |
| I am preoccupied with the thought of having fat on my body | | | | | | | |
| I take longer than others to eat my meals | | | | | | | |
| I avoid foods with sugar in them | | | | | | | |
| I eat diet foods | | | | | | | |
| I feel food controls my life | | | | | | | |
| I display self-control around food | | | | | | | |
| I feel that others pressure me to eat | | | | | | | |
| I give too much time and thought to food | | | | | | | |
| I feel uncomfortable after eating sweets | | | | | | | |
| I engage in dieting behaviour | | | | | | | |
| I like my stomach to be empty | | | | | | | |
| I have the impulse to vomit after meals | | | | | | | |
| I enjoy trying new rich foods | | | | | | | |

Appendix F

Behavioural Questions Garner et al., 1982

Think back over the last six months and please answer the following. Responses will remain anonymous.

In the past 6 months, have you:

| | Never | Once a month or less | 2-3 times a month | Once a week | 2-6 times a week | Once a day or more |
|---|-------|----------------------|-------------------|-------------|------------------|--------------------|
| Gone on eating binges where you feel that you may not be able to stop? ** Defined as eating much more than most people would under the same circumstances and feeling that eating is out of control. | | | | | | |
| Ever made yourself sick (vomited) to control your weight or shape? | | | | | | |
| Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape? | | | | | | |
| Exercised more than 60 minutes a day to lose or control your weight? | | | | | | |

Appendix G

Mount Allison Multidimensional Scale of Perceived Social Support Adapted from Zimet et al., 1988

We are interested in how you feel about the following statements. Read each statement carefully and indicate how you feel about each statement.

I can talk about my problems with members of the athletic department (coaches, staff).

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

There are people in the athletic department (coaches, staff) with whom I can share my joys and sorrows.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

My family really tries to help me.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

I get the emotional help and support I need from my family.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

I get the emotional help and support I need from within the athletic department.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

My friends/teammates really try to help me.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

I can count on my friends/teammates when things go wrong.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

I can talk about my problems with my family.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

I have friends/teammates with whom I can share my joys and sorrows.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

There are resources available in my athletic department to help me.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

My family is willing to help me make decisions.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

I can talk about my problems with my friends/teammates.

- 1 (very strongly disagree)
- 2 (strongly disagree)
- 3 (mildly disagree)
- 4 (neutral)
- 5 (mildly agree)
- 6 (strongly agree)
- 7 (very strongly agree)

Appendix H

The Adonis Complex Questionnaire (Pope et al., 2000)

In answering these questions, it is important to be totally honest. For some people, body appearance concerns and associated behaviours have become so familiar they hardly notice them anymore. Before you give a reflex answer of “rarely” or “never,” stop and think. All answers will remain anonymous.

How much time do you spend each day worrying about some aspect of your appearance (not just thinking about it, but actually worrying about it)?

- Less than 30 minutes
- 30-60 minutes
- More than 60 minutes

How often are you distressed by your appearance concerns (that is, feeling upset, anxious, or depressed)?

- Rarely or not at all
- Sometimes
- Frequently

How often do you avoid having all or parts of your body seen by others? For example, how often do you avoid locker rooms, swimming pools, or situations where you must take off your clothes? Alternatively, how often do you wear certain clothes to alter or disguise your body appearance such as a hat to hide your hair or baggy clothes to hide your body?

- Rarely or not at all
- Sometimes
- Frequently

How much total time do you spend each day on physical activities to improve your body appearance, such as lifting weights, doing sit-ups, or running on a treadmill? (Include only those sports activities in which one of your major goals is to improve appearance.)

- Less than 60 minutes
- 60-120 minutes
- More than 120 minutes

How often do you engage in dieting, eating special foods (for example, high protein or low-fat foods) or taking nutritional supplements specifically to improve your appearance?

- Rarely or not at all
- Sometimes
- Frequently

How much of your income do you spend on items designed to improve appearance (for example, diet foods, nutritional supplements, hair products, cosmetic procedures, workout equipment, or gym memberships)?

- Negligible
- A more substantial amount, but never to the point of creating financial problems.
- Enough to cause financial problems at some point

How much have your appearance-related activities undermined your social relationships? For example, have your workout activities, dietary practices, or other appearance-related behaviours compromised your relationships with other people?

- Rarely or not at all
- Sometimes
- Frequently

How often has your sex life been compromised by your appearance concerns?

- Rarely or not at all
- Sometimes
- Frequently

How often have appearance-related concerns or activities compromised your job or career (or academic performance)? For example, have you been late, missed work or school, worked below your potential, or lost opportunities for advancement because of your appearance related needs or self-consciousness?

- Rarely or not at all
- Sometimes
- Frequently

How often have you avoided being seen by other people because of your appearance concerns (for example, not going to school, work, social events or out in public)?

- Rarely or not at all
- Sometimes
- Frequently

Have you ever taken any type of drug—legal or illegal—to gain muscle, lose weight or improve your appearance?

- Never
- Only legal drugs purchased over the counter or by prescription
- Illegal use of steroids, diet pills, or other substances

How often have you used more extreme measures (other than drug use) to change your appearance, such as excessive exercising, working out even when injured; fasting or other unhealthy dietary activities; vomiting, use of laxatives or other “purging” methods; or unconventional techniques for muscle development, hair growth, penile enlargement, etc.?

- Rarely
- Sometimes
- Frequently