

AN EXAMINATION OF THE FREQUENCY AND PSYCHOLOGICAL PREDICTORS OF
DISORDERED EATING IN FEMALE SUB-ELITE FIGURE SKATERS

By

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ABSTRACT

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Figure skating has traditionally been considered an “at risk” sport for the development of disordered eating. However, little data exist to support these anecdotal claims with most research focusing on female skaters at the elite level. The primary purpose of this study was to examine the frequency and psychological predictors of disordered eating among female sub-elite skaters. Enough data were collected to also conduct additional analyses with male skaters and make various group comparisons across the sport. A survey battery was administered to skaters across five states, which yielded a final sample of 301 participants ages 12 to 26. Results showed that the majority of skaters were not symptomatic of an eating disorder and actually cited numerous benefits of skating on body image, eating, and exercise. A smaller proportion of skaters scored within clinical range of an eating disorder (i.e., 13.1% [23/176] of female sub-elite skaters, 13.2% [10/76] of female elite skaters, and 3.7% [1/27] of male skaters), but were no more symptomatic than their adolescent and college-aged peers when compared to existing normative data. Among female sub-elite skaters, disordered eating was significantly predicted by body dissatisfaction, perceived weight pressures, and both positive and negative perfectionism ($p < .05$). Across the entire sample, disordered eating did not differ by skating discipline, competitive level, or sex ($p < .05$). Together, results suggest that figure skating has the potential to both positively and negatively influence body image, eating, and exercise. Researchers and practitioners are encouraged to adopt a dual-pronged approach such that efforts are made to not only minimize the possible detriments associated with figure skating, but to also maximize its many strengths.

DEDICATION

This dissertation is dedicated to my loving family and friends and athletes everywhere struggling with negative body image and disordered eating.

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CHAPTER I

INTRODUCTION

The feminization of figure skating is largely attributed to Sonja Henie, a Norwegian figure skater and film star of the 1930s and forties. A three-time Olympic and ten-time World Champion, Henie is known for popularizing and transforming figure skating from a sport of technical skill to one that also emphasizes artistic expression. Lippe (2001) describes Henie's contribution to the sport: "...her athletic but flowing style, her showmanship and glamorous outfits, and her blond good looks transformed the sport to one based on style and glamour as well as athleticism" (p. 502). Some scholars argue that no other athlete has made a greater impact on women's figure skating than Henie (e.g., Adams, 2010; Herzog, 1996; Lippe, 2001). Her influence is evidenced by the dramatic increase in skate production, demand for skating apparel, and ice rink construction in the United States during her era (Adams, 2010). Interestingly, in introducing the aesthetic appeal of the sport with white skating boots and shorter skirts, Henie reportedly followed a strict diet since 8 years of age (Adams, 2010; Strait & Henie, 1990) and struggled with bulimia nervosa throughout her career (Herzog, 1996; Strait & Henie, 1990).

The unique combination of athleticism and grace continues to shape figure skating today. Since Henie's skating career, a number of other well-known figure skaters have broadcasted the importance of appearance in their sport. For example, Kristi Yamaguchi, a World and Olympic Champion American figure skater, reported to CBS television that "...people come to watch you because, you know, it's supposed to be a beautiful sport and the costumes are just part of it" (CBS, 1992; Feder, 1994). Later in *American Fitness* magazine, she further stated:

A large part of skating is about how you look...As a professional, I think we're not being judged solely on technical ability anymore. People really want to be entertained and

enjoy what they're watching. Obviously, I have to be in good health to skate well, but I think you become more aware of fashion in skating and how it complements or detracts from performance (Siegler, 2000, p. 19).

The importance of costumes and artistic expression has also become a point of contention and enviousness among competitors. World Champion and Olympic figure skater from Japan, Midori Ito, reported to *Newsweek*: "All I can really do is jump. Figure skating is a matter of beauty, and Westerners are so stylish, so slender. I wish I could be beautiful like them" (Deford, 1992, p. 3). Such sentiments have also become an inherent part of the media on figure skating. Dick Button, a former American figure skater and figure skating analyst, reported on the women's event in the 1992 Olympics: "The easiest thing is to get here. The hardest is to get that last one percent. You can't have anything out of place. Tonya Harding's dresses don't help." In addition to assessing the skaters' attire, Button also provided commentary on their physical features: "Look at her leg. It looks like a hunk of sausage" (Sandomir, 1992, para. 11). Based on these examples, the importance of appearance and the critical side of elite figure skating is clear.

Unfortunately, the tremendous emphasis on aesthetics and the demands to skate faster and jump higher may be linked to growing concerns over weight, appearance, body shape, and disordered eating in both male and female figure skaters. For example, Alexei Yagudin, a Russian World and Olympic Champion, was reported to have stopped eating after losing to Evgeni Plushenko at the 2001 World Championships and lost 18 lbs in 5 weeks to become lighter and jump higher (Suddath, 2010). He is believed to have limited himself to one small meal a day and engaged in compulsive exercising to achieve the weight that ultimately led to drastic performance decrements (Cruz, 2002). Jenny Kirk, a recently retired national level skater

ended her career due to disordered eating and is one of the few to acknowledge the scale and scope of this problem:

It wasn't until I was on tour, spending months at a time with the best skaters in the world, that I saw how prevalent disordered eating was amongst the top skaters in the sport. Based on my experience there, and after speaking with skaters after leaving the sport, I would say about 85% of skaters have suffered or are suffering with various forms of disordered eating (Coker, 2011, para. 8).

Although precise prevalence estimates are currently unknown, anecdotal accounts suggest a high level of weight pressures and disordered eating behaviors in the figure skating world. Kirk also commented on the role of skating in the development and maintenance of her eating disorder:

Eating disorders aren't caused by just *one* thing. However, being in the skating world fostered the disease and made the completely horrible things I was doing to my body every day seem "normal." ... The more I was living in this weight-obsessed sport, the more I sunk deeper and deeper into my own web of eating disorder hell. I couldn't believe that so many skaters struggled with the same thing as me, and yet so many of them appeared completely content with ruining their bodies in order to achieve a certain image (J. Kirk, 2009, para. 4, 12).

Kirk's account suggests that disordered eating may be a normative part of some figure skating subcultures (e.g., elite level skating teams) that is promoted both by the demands of the sport as well as important others in the skating environment.

Based on the literature on media influences and modeling behavior (e.g., Bissel, 2004; Stice, Spangler, & Stewart, 2001), the appearance-based ideologies of elite level figure skaters may also be observed among those at the sub-elite level (i.e., among skaters who are committed

to figure skating, but never experience the pressures of national and international competition). Anecdotal accounts suggest that figure skating in general has become characterized by attention to appearance, a fine balance between toughness and femininity, constant impression management, and pressure to be thin (e.g., Ryan, 1995). Disordered eating may therefore be an important health concern for skaters across all levels of participation.

Overview of the Problem

Disordered eating is often used as a global term that includes clinical eating disorders (i.e., those who meet all diagnostic criteria) and subclinical eating disorders (i.e., those who meet some but not all diagnostic criteria) (Beals, 2000). Both clinical and subclinical forms of disordered eating have become a widespread concern in a range of female sports and competitive levels. Although prevalence rates vary across studies, as much as 18% of high school (Nichols, Rauh, Lawson, Ji, & Barkai, 2006) and up to 62% of college and elite female athletes (American College of Sports Medicine, 1997) have been classified with disordered eating. Female athletes in sports that emphasize appearance and/or leanness as a means of achieving optimal performance outcomes, such as swimmers, divers, rowers, dancers, gymnasts, runners, and figure skaters, may be especially at risk for developing disordered eating patterns (e.g., Beals & Manore, 1994; Garner & Rosen, 1991). In addition to females, recent evidence suggests that male athletes are also at risk (e.g., Baum, 2006; Galli & Reel, 2009; Petrie, Greenleaf, Reel, & Carter, 2008; Sansone & Sawyer, 2005). Petrie et al. (2008) found that nearly 20% of their male collegiate athlete sample was symptomatic of an eating disorder. Although female athletes are considered to be most at risk for disordered eating, male athletes are not exempt from these problems. Interestingly, disordered eating has not been thoroughly examined in male figure

skaters and, yet, the judging criteria and culture in which they train is similar to that of their female counterparts.

The physical and psychological problems associated with disordered eating have been well-documented in the literature. Physical consequences can include menstrual dysfunction, poor bone health (Beals & Meyer, 2007), a range of medical complications (Becker, Grinspoon, Klibanski, & Herzog, 1999), and other health-related effects such as chronic fatigue, electrolyte imbalances, and decreased immune functioning (Brownell, Steen, & Wilmore, 1987).

Psychological disturbances often comorbid with disordered eating may include mood, anxiety, and personality disorders as well as substance abuse problems (American Psychiatric Association, 2000). Together, both the physical and psychological effects of disordered eating may contribute to declines in athletic performance (e.g., Choma, Sforzo, & Keller, 1998; Felsten & Wilcox, 1993; Fogelholm, 1994; Terry, Lane, & Warren, 1999). Although not all athletes meet clinical diagnosis for an eating disorder, the detrimental effects of even a single disordered eating behavior can compromise an athlete's health.

Due to the severe consequences of disordered eating on physical and psychological functioning, this topic deserves ample empirical attention, particularly within sport. A plethora of research has been conducted on disordered eating in athletes, including swimmers (e.g., Dummer, Rosen, Heusner, Roberts, & Counsilman, 1987; Ferrand, Magnan, Rouveix, & Filaire, 2007), rowers (e.g., Karlson, Black Becker, & Merkur, 2001; Sykora, Grilo, Wilfley, & Brownell, 1993; Terry et al., 1999), dancers (e.g., Anshel, 2004; Hincapié & Cassidy, 2010), gymnasts (e.g., Kerr, Berman, & De Souza, 2006; Rosen & Hough, 1988; Sundgot-Borgen, 1996), and runners (e.g., Clark, Nelson, & Evans, 1988; Hausenblas & McNally, 2010). In addition to these athletes, anecdotal evidence suggests that figure skaters are also at risk for

developing disordered eating patterns. For example, Ryan's (1995) book *Little Girls in Pretty Boxes* continues to raise much concern over the physical and psychological health of figure skaters, including the adoption of disordered eating practices. The aesthetic and self-presentational component of the sport is believed by scholars to be one reason why figure skaters may be increasingly prone to disordered eating (Martin & Mack, 1996), especially when their body types do not meet standards of leanness and linearity (Monsma, Malina, & Feltz, 2006).

Despite these assumptions, a thorough review of the literature reveals that little research has examined disordered eating in figure skaters. It should be noted that some investigators have included figure skaters in their sample as a means of representing athletes in sports that emphasize aesthetics and leanness (e.g., Vadocz, Almeida, & Pfeiffer, 2003). However, fewer than 15 studies have examined the unique characteristics of figure skaters alone and explored the relationship between factors associated specifically with their sport and disordered eating. Examination of disordered eating among male skaters as well as those who never reach elite levels of competition is especially lacking. Future research is warranted to ensure that young athletes at all competitive levels can safely reap the benefits of participation in this popular sport involving a unique blend of power, athletic ability, grace, and artistic expression.

Significance

Disordered eating in figure skaters is an important topic of inquiry for several reasons. First, initial findings indicate that weight pressures and disordered eating exist among figure skaters and other similar aesthetic sport participants (e.g., de Bruin, Oudejans, & Bakker, 2007; Hausenblas & Carron, 1999; Krentz & Warschburger, 2011; Sundgot-Borgen, 1994; Taylor & STE-Marie, 2001). Second, recent trends suggest that skaters may be at greater risk for disordered eating today than ever before as participation rates increase (US Figure Skating,

2010e), skills become more difficult (U.S. Figure Skating Association, 1998), and costumes become more revealing (Hines, 2006; Les, 2010). Lastly, a need exists for new research on weight pressures and disordered eating to guide prevention and intervention efforts as well as to enhance the youth skating experience.

Preliminary evidence for disordered eating in figure skaters. Preliminary evidence suggests that figure skaters, especially elite level females, have inadequate dietary intake (e.g., Ziegler, Khoo, Kris-Etherton et al., 1998; Ziegler, Nelson, & Jonnalagadda, 1999), are concerned about their appearance, weight, and body shape (e.g., Jonnalagadda, Ziegler, & Nelson, 2004; Rucinski, 1989), and engage in pathogenic weight control behaviors, including excessive exercise, fasting, dieting, vomiting, and diet pill use (Zatalan & Zatalan, 2003). Research also indicates that skaters believe that their sport is associated with pressures to lose or maintain weight (Taylor & STE-Marie, 2001; Zatalan & Zatalan, 2003). Although preliminary findings indicate that a problem exists, the mechanisms underlying negative body attitudes and disordered eating practices in figure skaters is not fully understood, including the psychological variables that predict these outcomes. In addition, while most research has focused on elite level skaters, even less is known about those at sub-elite levels who represent the majority of all figure skating participants.

Recent trends in figure skating. The popularity of figure skating has grown considerably over the last century, particularly in the US. The United States Figure Skating Association (USFSA) has over 180,000 members (72% females; 25% males; 3% unspecified), includes more than 680 clubs and 1,000 basic skills programs, and sanctions over 1,300 figure skating events each year (US Figure Skating, 2012). Collectively, the US figure skating team has won more Olympic medals (46) than any other country (US Figure Skating, 2010e), which has

spurred tremendous interest among spectators, youth participants, and their parents. As both participation rates and enthusiasm for the sport continue to rise, ensuring that youth are accruing positive developmental gains through their skating experience becomes increasingly critical. Reducing potential risk factors for unhealthy behavior like disordered eating and poor body image are therefore important considerations.

In addition to participation rates, other recent trends suggest that the pressure to lose or maintain weight in figure skating may be also increasing. For example, in its early form, skating competitions were judged based on the design of the figures etched into the ice rather than how the movements were performed (U.S. Figure Skating Association, 1998). Figure skating has since shifted its focus away from the school of figures to the quality of performance and introduced increasingly complex jumps and spins. Henie's competitive best during the 1930s and forties included two single axels performed in a row (U.S. Figure Skating Association, 1998). Today, both male and female skaters are required to perform a greater frequency of jumps and spins (e.g., 7 jumps and 3 spins in a senior level test program), more revolutions (e.g., double, triple, and quadruple), and elaborate footwork. The speed and height required to execute these increasingly complex skills favor lighter and leaner skaters. Modern-day youth participants may therefore perceive greater pressures to lose or maintain weight in order to successfully perform the difficult elements required.

Moreover, in an examination of the evolution of skating costumes worn by females in practice and competition (e.g., Hines, 2006; Les, 2010), the attire has become increasingly revealing. Over the past century, skirts have become shorter to allow for more flexible movement and enhance aesthetic appeal. High turtlenecks and long sleeves have similarly transformed into plunging necklines and sleeveless dresses. As appearance and artistic expression remain one of

the most important elements of skating performance, anxiety over weight, body shape, and how one appears in a skating costume may be special concerns among today's youth skating participants. Dancers and cheerleaders who are faced with similar presentational components have reported that revealing athletic attire is indeed a salient weight pressure (e.g., Reel & Gill, 1998; Reel, SooHoo, Gill, & Jamieson, 2005).

Skating costumes for male skaters do not appear to have undergone the same type and degree of change over time as that for female skaters. However, similar to their female counterparts, male skaters must also wear form-fitting shirts, pants, and bodysuits and may also face pressures to meet appearance standards for their sport. This may be especially difficult for those male skaters who naturally grow larger muscles during puberty as well as for male pair skaters who must strike a balance between building size and strength to lift their partner with leanness and linearity for visual appeal. Interestingly, Reel and Gill (1998) found that both the team uniform and pressure to gain weight were important pressures faced by male college cheerleaders. In light of the aforementioned trends, examining weight pressures and disordered eating specifically within figure skaters is an important endeavor from both a developmental and health perspective.

Prevention and intervention efforts in figure skating populations. A thorough exploration of the frequencies and unique antecedents of disordered eating attitudes and behaviors in figure skaters is necessary to inform prevention and intervention efforts. If precise psychological and contextual variables are identified as salient predictors of disordered eating, then concerted attempts can be made to enhance protective factors (e.g., promote self-esteem, adaptive perfectionism) and reduce risk factors (e.g., weight pressures) (Stice, 2002) specifically within the figure skating environment. Antecedents predicting the emergence of disordered

eating will also aid coaches, sport psychology practitioners, athletic trainers, nutritionists, and other health professionals in identifying high risk groups for selective prevention programming within the skating world. This may be particularly important given that prevention programs with non-athlete populations tend to have the greatest benefits for those who express initial signs of pathology (Fingeret, Warren, Cepeda-Benito, & Gleaves, 2006; Killen et al., 1993). In addition, understanding the impact of several risk factors together (e.g., body dissatisfaction, perceived weight pressures, low self-esteem, high negative perfectionism, and high athletic identity) may inform the development of more comprehensive screening instruments that detect those at highest risk as opposed to each risk factor in isolation (Stice, 2002). Lastly, gaining a more comprehensive knowledge base on the nature of disordered eating in figure skaters may guide prevention programming aimed to assist these athletes in building healthy self-perceptions, eating behaviors, and exercise habits that optimize both the skating experience and developmental outcomes. Without these efforts, disordered eating and its associated short and long term consequences will continue to be a concern among this potentially vulnerable population of athletes.

Study Purposes and Aims

Given that much of the research on disordered eating in figure skaters has focused on females competing at elite levels of competition, the primary aim of this study was to first examine disordered eating among those competing at the sub-elite level (i.e., those who have never competed nationally or internationally). Specifically, the primary purposes were to (a) assess the frequency of disordered eating attitudes and behaviors in female sub-elite figure skaters; (b) describe the psychological characteristics of female sub-elite figure skaters, including body dissatisfaction, perceived weight pressures, self-esteem, perfectionism, and athletic

identity; (c) examine possible contributors to disordered eating attitudes and behaviors in female sub-elite figure skaters; and (d) gain a preliminary understanding of the role of figure skating in shaping body image, eating, and exercise habits in female sub-elite figure skaters.

The secondary aim of this study was to address a series of questions with other sub-groups of figure skaters pending the appropriate sample sizes were obtained. These secondary purposes were to (a) assess the frequency of disordered eating attitudes and behaviors in male figure skaters; (b) describe the psychological characteristics of male figure skaters, including body dissatisfaction, perceived weight pressures, self-esteem, perfectionism, and athletic identity; (c) examine possible contributors to disordered eating attitudes and behaviors in male figure skaters; (d) gain a preliminary understanding of the role of figure skating in shaping body image, eating, and exercise habits in male figure skaters; (e) compare disordered eating attitudes and behaviors as a function of skating discipline (i.e., singles, pairs, ice dancing, and synchronized); (f) compare disordered eating attitudes and behaviors as a function of competitive level (i.e., elite and sub-elite); and (g) compare disordered eating attitudes and behaviors as a function of sex.

Research Questions and Hypotheses

The research questions and hypotheses addressed in this dissertation were organized into three parts: primary, secondary, and exploratory. Primary research questions referred to the primary aims of the dissertation and focused on female sub-elite figure skaters. Secondary research questions referred to the secondary aims of the dissertation and focused on male skaters and group comparisons across the sport pending enough data were collected to conduct the necessary analyses. Some primary and secondary research questions were accompanied by hypotheses determined prior to the start of the study based on previous research. Others did not

warrant a hypothesis because of the limited research pertaining to that question. Finally, the exploratory research questions were developed following data collection and were therefore not accompanied by an a priori direction of results. All research questions and hypotheses are outlined next.

Primary research question 1. *What is the frequency of disordered eating attitudes and behaviors in female sub-elite figure skaters?*

Primary research question 2. *What are the psychological characteristics of female sub-elite figure skaters?*

Primary research question 3. *What are the contributors of disordered eating attitudes and behaviors in female sub-elite figure skaters?*

H1: Disordered eating attitudes and behaviors in female sub-elite figure skaters will show a significant positive relationship with years in skating.

H2: Disordered eating attitudes and behaviors in female sub-elite figure skaters will differ by competitive experience (i.e., never competed, local competition, open event/non-qualifying regionals, qualifying regionals, sectionals, collegiate competition).

H3: Disordered eating attitudes and behaviors in female sub-elite figure skaters will be significantly predicted by a combination of psychological variables (i.e., body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity).

Primary research question 4: *What is the perceived role of figure skating in shaping body image, eating, and exercise habits in female sub-elite figure skaters?*

Secondary research question 1. *What is the frequency of disordered eating attitudes and behaviors in male figure skaters?*

Secondary research question 2. What are the psychological characteristics of male figure skaters?

Secondary research question 3. What are the contributors of disordered eating attitudes and behaviors in male figure skaters?

Secondary research question 4. What is the perceived role of figure skating in shaping body image, eating, and exercise habits in male figure skaters?

Secondary research question 5. Do disordered eating attitudes and behaviors in figure skaters differ by skating discipline (i.e., singles, pairs, dance, and synchronized)?

H1: Disordered eating attitudes and behaviors will be more frequently reported by figure skaters in disciplines requiring flight patterns (i.e., singles, pairs, ice dancers) than those that do not (i.e., synchronized).

Secondary research question 6. Do disordered eating attitudes and behaviors in figure skaters differ by competitive level?

H1: Disordered eating attitudes and behaviors will be significantly greater in elite figure skaters than sub-elite figure skaters.

Secondary research question 7. Do disordered eating attitudes and behaviors in figure skaters differ by sex?

H1: Disordered eating attitudes and behaviors will be significantly greater in female figure skaters than male figure skaters.

Exploratory research question 1. Do body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity differ by symptom status among female sub-elite figure skaters?

Exploratory research question 2. *Can the combination of body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity be used to predict whether female sub-elite figure skaters report a symptomatic score on the EAT-26 (i.e., ≥ 20)?*

Limitations and Assumptions

This study was limited by: (a) the ability and willingness of athletes to honestly and accurately respond to survey items; (b) the fact that participation was voluntary and may have excluded skaters who either did not see the issue as important or were uncomfortable reporting on the topic because they currently struggle with disordered eating; (c) a selection bias due to employing a convenience rather than random sample; and (d) the inability to determine causal relationships between variables due the nature of field research and the lack of a true experimental design. In this study, it was assumed that skaters would honestly and accurately respond to survey items and that the instruments used would adequately measure the constructs being tested.

Operational Definitions

The following operational definitions were used in this study:

Figure Skating: Figure skating is an Olympic sport in which jumps, spins, footwork, spiral sequences, lifts, and other challenging skills are performed on ice skates. Figure skating performances are judged based on technical elements (e.g., jumps, lifts, spins) as well as five additional program components, including: skating skills (e.g., balance, flow, multi-directional skating); transitions/linking footwork and movement (e.g., variety, difficulty, quality); performance/execution (e.g., physical, emotional, and intellectual involvement); choreography/composition (e.g., idea, concept, or vision, unity, pattern and ice coverage); and

interpretation (e.g., expression of the style, character, or rhythm of the music, finesse) (US Figure Skating, 2010b). In ice dancing, the compulsory/pattern dance is judged based on skating skills, performance/execution, interpretation as well as an additional timing component (e.g., in time with the music/beat) (US Figure Skating, 2010b). The terms “figure skating” and “skating” are used interchangeably.

Skating Discipline: Skating discipline refers to one of four primary disciplines in the sport of figure skating, including singles skating, pairs skating, ice dancing, and synchronized skating.

Singles Skating: Singles skating is a discipline of figure skating consisting of male and female events that require the athlete to train and compete individually. Elements performed include jumps, spins, footwork, spiral sequences, and other technical skills (US Figure Skating, 2010c).

Pairs Skating: Pairs skating is a discipline of figure skating requiring a male and female skater (i.e., a pairs team) to perform together. Elements performed include throw jumps in which the male throws his female partner into the air; lifts in which the male holds his female partner above his head; pair spins in which both partners jointly spin about a single axis; and side-by-side jumps and spins in which both partners independently perform the elements in unison (US Figure Skating, 2010c).

Ice Dancing: Ice dancing is a discipline of figure skating requiring a male and female skater (i.e., a dance team) to perform together. Elements performed include elaborate footwork, dance patterns, and lifts below the shoulder (US Figure Skating, 2010a).

Synchronized Skating: Synchronized skating is a discipline of figure skating comprised of a team of 12 to 20 skaters who perform as a single unit. Teams may be mixed-sex. Elements include complex formations among all members of the team, such as wheels, blocks, lines, circles, and intersections (US Figure Skating, 2010d).

Skating Focus: Some figure skaters participate in more than one skating discipline. Skating focus therefore refers to the discipline that the skater considers a priority (e.g., devotes the greatest level of time, energy, and commitment).

Competitive Experience: Competitive experience refers to skaters' highest level of competition (i.e., never competed, local competition, open event/non-qualifying regionals, qualifying regionals, sectionals, collegiate competition, national competition, and international competition).

Competitive Level: Competitive level refers to whether skaters have competed at an elite or sub-elite level.

Sub-Elite Level: The sub-elite level refers to those who have never competed at the national or international level of competition.

Elite Level: The elite level refers to those who have competed at the national or international level of competition.

CHAPTER II

REVIEW OF LITERATURE

This review of literature will provide a comprehensive summary of the research on disordered eating in athletes, particularly figure skaters. The words “figure skater” and “skater” will be used as general terms to describe those participating in any skating discipline (i.e., singles, pairs, ice dancing, or synchronized). Relevant terminology in the eating disorder literature is discussed first, followed by an overview of the primary physical, psychological, and performance consequences of clinical and subclinical eating disorders. Next, prevalence estimates and trends both in the general population and within sport are discussed, as well as risk factors associated with the development of disordered eating in sport. Key studies that have shaped our current understanding of disordered eating in figure skaters are thoroughly reviewed. This chapter concludes with a summary of relevant gaps in the literature and the purposes of the present study.

Relevant Terminology in the Eating Disorder Literature

Understanding the eating disorder literature requires knowledge of the terminology used to describe and categorize the many forms of this phenomenon. Figure 1 offers a schematic for how important terms will be used in this dissertation. “Disordered eating” is often used as an umbrella term to describe the full range of clinical and subclinical forms of eating disorders (Beals, 2000). Specific types of clinical and subclinical eating disorders and other relevant terminology are discussed in turn. For more detailed information on diagnostic criteria, the reader is directed to the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition Text Revision (American Psychiatric Association, 2000), which will henceforth be referred to as the DSM-IV-TR.

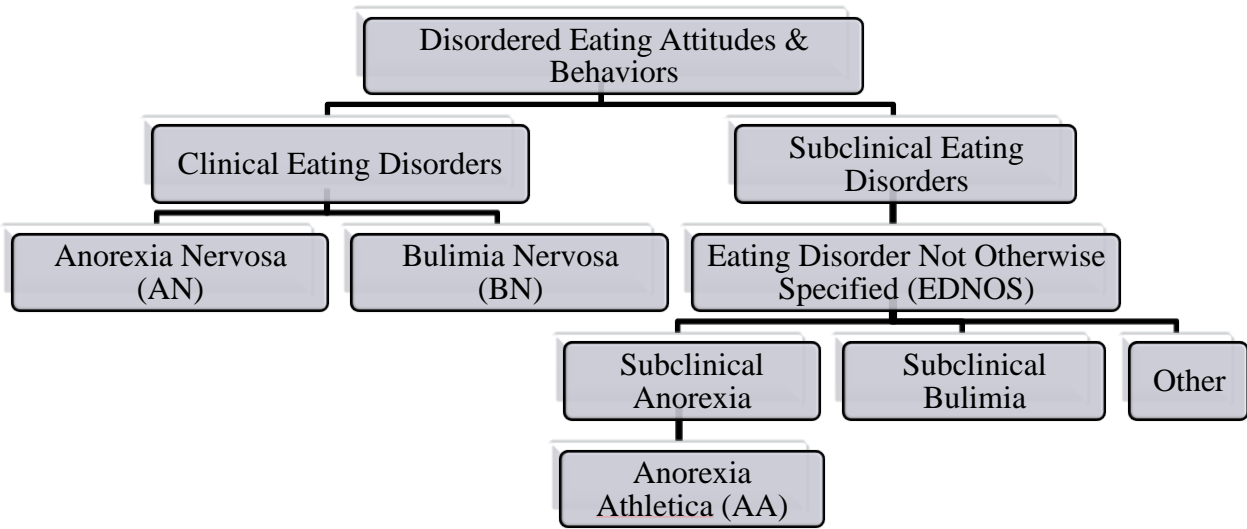


Figure 1. Relevant terminology in the eating disorder literature

Clinical eating disorders. The term “clinical eating disorder” is used to describe problematic eating attitudes, behaviors and/or body image distortions that meet diagnostic criteria set forth by the DSM-IV-TR. The two primary types of clinical eating disorders include anorexia nervosa and bulimia nervosa. Anorexia nervosa is characterized by a refusal to maintain at least 85% of expected body weight, an intense fear of weight gain, severe body image distortions, and amenorrhea (i.e., absence of at least three consecutive menstrual cycles) in postmenarcheal females (American Psychiatric Association, 2000). Those with anorexia nervosa can be categorized as a restricting type or binge-eating/purging type (American Psychiatric Association, 2000). In contrast, bulimia nervosa is characterized by recurrent binge eating, problematic compensatory methods to prevent weight gain (e.g., self-induced vomiting, use of laxatives, excessive exercise), as well as a self-perception that is excessively influenced by perceived body shape or weight (American Psychiatric Association, 2000). Those with bulimia

nervosa can be categorized as a purging type or non-purging type (American Psychiatric Association, 2000).

Subclinical eating disorders. The term “subclinical eating disorder” is used to describe problematic eating attitudes, behaviors, and/or body image distortions that meet some but not all DSM-IV-TR diagnostic criteria. Although these individuals cannot be clinically classified with anorexia nervosa or bulimia nervosa, they still present with attitudes and behaviors that pose a number of physical and psychological health risks. These sub-diagnostic forms of eating disorders can include subclinical anorexia (i.e., meeting some but not all criteria for anorexia nervosa), subclinical bulimia (i.e., meeting some but not all criteria for bulimia nervosa), or mixed symptoms that do not meet diagnosis for either clinical eating disorder. If seen by a licensed health professional, any subclinical form of an eating disorder is classified as Eating Disorder Not Otherwise Specified (EDNOS) (American Psychiatric Association, 2000). The DSM-IV-TR provides possible symptom presentations that warrant an EDNOS classification.

Although not an official part of the DSM-IV-TR, a growing body of literature has recognized another subclinical form of anorexia nervosa found specifically in athletes called “anorexia athletica.” Sundgot-Borgen (1993a) identified several distinguishing features of anorexia athletica in elite female athletes, such as restricted caloric intake of less than 1,200 kcal/day, weight loss greater than 5% of expected body weight, gastrointestinal complaints, and excessive fear of becoming overweight. Binge-eating, self-induced vomiting, and the use of laxatives or diuretics are often reported among athletes with this subclinical form of anorexia nervosa (Beals & Manore, 1994). Although some studies have examined the prevalence of anorexia athletica among various athletic groups (e.g., Byrne & McLean, 2002; Herbrich, Pfeiffer, Lehmkuhl, & Schneider, 2011; Sundgot-Borgen, 1993b, 1996; Sundgot-Borgen &

Torstveit, 2004; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008), Herbrich and colleagues (2011) specifically call for research that better defines this potentially sport-specific condition and thoroughly examines its course and development.

Prevalence Estimates and Trends

Prevalence estimates are a key factor in understanding the scale and scope of disordered eating attitudes and behaviors across individuals at a given point in time. Trends pertaining to the prevalence of clinical and subclinical eating disorders will be discussed in the context of both the general population as well as sport. In accordance with the population of interest for this dissertation, data presented will primarily focus on prevalence rates within the US.

Trends in the general population. Prevalence estimates for clinical eating disorders in the general population are relatively low. According to the DSM-IV-TR, the lifetime prevalence rate of anorexia nervosa and bulimia nervosa is .5% and 1% to 3% respectively in females (American Psychiatric Association, 2000). The lifetime prevalence rate for both types of clinical eating disorders in males is one tenth of that for females (American Psychiatric Association, 2000). However, recent data suggest that the prevalence of clinical eating disorders may be increasing. In a nationally representative survey between 2001 and 2003, .9% of women and .3% of men reported having anorexia nervosa, while 1.5% of women and .5% of men reported having bulimia nervosa at some point in their lives (Hudson, Hiripi, Pope, & Kessler, 2007). Increasing prevalence estimates may reflect methodological discrepancies, a rise in the number of individuals seeking mental health treatment for eating-related problems, or a true increase in the incidence of clinical eating disorders. However, data suggesting that females are far more likely to develop clinical eating disorders than males remains consistent.

Upon examination of the prevalence rates for clinical eating disorders, the percentages appear small. However, given the severity of the physical and psychological consequences, even a small proportion of individuals suffering from a clinical eating disorder are cause for concern. Moreover, the aforementioned prevalence estimates do not include the many more individuals with subclinical forms of eating disorders. For example, several studies indicate that more than 50% of adult outpatients are given an EDNOS classification because they do not meet clinical diagnosis for anorexia nervosa or bulimia nervosa (Button, Benson, Nolle, & Palmer, 2005; Fairburn et al., 2007; Ricca et al., 2001; Turner & Bryant-Waugh, 2004). It is reasonable to conclude that subclinical eating disorders are far more common than clinical eating disorders. Within the general population, adolescent girls are believed to be at the highest risk for developing disordered eating attitudes and behaviors, particularly subclinical forms (Lewinsohn, Striegel-Moore, & Seeley, 2000; Touchette et al., 2011). Lifetime prevalence rates for any clinical or subclinical eating disorder have been reported at 17.9% for adolescent girls compared to 6.5% for adolescent boys between the ages of 14 and 15 years (Kjelsås, Bjørnstrøm, & Gøtestam, 2004).

In summary, data on the general population suggest that the prevalence of clinical eating disorders is low, but that subclinical forms characterize most eating disorder cases. Preliminary research indicates that disordered eating may be increasing. However, research consistently shows that females are most at risk, particularly during adolescence. Similar trends have been demonstrated in the sport context.

Trends in sport. The prevalence of clinical and subclinical forms of eating disorders in athletes has received much attention. Comparisons based on athletic status, sex, competitive level, and sport type are discussed. Despite some research remaining inconclusive, all point to

the notion that disordered eating may be a concern among female athletes engaging in lean or aesthetic-based sports in particular.

Athletic status. A plethora of research has compared eating disorder symptomatology in athletes and non-athletes. Several studies show that disordered eating may be more prevalent in athletes than their non-athlete counterparts. For example, in a meta-analysis of 92 studies on indices of anorexia nervosa, bulimia nervosa, and drive for thinness in male and female athletes, a small but significant effect size indicated that athletes reported more eating disorder symptoms than non-athlete controls (Hausenblas & Carron, 1999).

Similar results have been found specifically at the elite, collegiate, and high school levels. For example, in a study of the entire population of Norwegian male and female elite athletes ($n = 1,620$) and non-athlete controls ($n = 1,696$), more athletes (13.5%) than controls (4.6%) reported clinical and subclinical eating disorders (Sundgot-Borgen & Torstveit, 2004). Similar results were found in a mixed sample of elite and collegiate female athletes and non-athletes (Davis & Cowles, 1989). Taube and Blinde (1992) examined 100 high school female athletes and 112 high school female non-athletes and found that athletes were more likely to possess certain behavioral and psychological correlates of eating disorders, including perfectionism and symptoms of bulimia nervosa (i.e., bingeing and purging). The literature suggesting that disordered eating may be a greater concern in athletes than non-athletes is considerable.

In contrast, other studies suggest that eating disorder symptomatology in athletes is either no different from or actually lower than in non-athletes. For example, in a study of 84 collegiate female athletes and 62 same-age non-athlete controls, Reinking and Alexander (2005) found fewer disordered eating symptoms in athletes than those who did not participate in a collegiate

sport. In fact, athletes reported lower body dissatisfaction than their non-athlete counterparts. Similar results were found in other studies with collegiate athletic samples (e.g., Ashley, Smith, Robinson, & Richardson, 1996; G. Kirk, Singh, & Getz, 2001; Sanford-Martens et al., 2005; Wilkins, Boland, & Albinson, 1991).

Given the contradictory findings, the debate on whether athletes or non-athletes are more at risk for disordered eating is ongoing. Reasons for the discrepancy in results across studies may include differences in sport type classifications or the methodology used to examine disordered eating. Interestingly, studies in support of the notion that disordered eating is greater in athletes appear to examine athletic populations across high school, collegiate, and elite competitive levels. In contrast, studies suggesting that disordered eating is greater in non-athletes appear to focus on collegiate level samples.

Despite disagreements in the literature, results indicating that disordered eating exists among athletic populations are consistent across studies. For example, although Sanford-Martens et al. (2005) concluded that disordered eating may be a greater concern for male and female non-athletes than athletes, nearly one-fifth of the athletes in their study ($n = 325$) still reported behaviors symptomatic of an eating disorder. In turn, studies indicating a greater prevalence of disordered eating in non-athletes should not lead researchers and practitioners to overlook athlete populations.

Sex differences. Other studies have identified sex differences relative to disordered eating. Although a growing body of research suggests that male athletes engage in unhealthy weight control behaviors (e.g., Dale & Landers, 1999; Glazer, 2008), female athletes appear to be at greater risk for the development of both clinical and subclinical eating disorders. For example, in a study of 1,445 Division I collegiate athletes, 9.2% of females were identified as

having clinically significant problems with anorexia nervosa compared to only .01% of males. Moreover, 2.9% of females as compared to 0% of males were identified as having clinically significant problems with bulimia nervosa (C. Johnson, Powers, & Dick, 1999). Similar discrepancies between male and female athletes exist at the high school level. In a study of 576 high school athletes and 291 high school non-athletes in Germany, results indicated that females showed a significantly higher frequency of disordered eating than did males (Rosendahl, Bormann, Aschenbrenner, Aschenbrenner, & Strauss, 2009). Other studies demonstrate similar results (e.g., Dummer et al., 1987; Sykora et al., 1993; Terry & Waite, 1996). In turn, the literature suggests that like females in the general population, female athletes are also at greater risk for disordered eating than their male athlete counterparts.

Although the research tends to show that disordered eating is greatest in female athletes, preliminary evidence suggests that some male athletes also engage in unhealthy eating behaviors. For example, in a study of 85 wrestlers and 75 non-wrestler controls, Dale and Landers (1999) found no significant differences for bulimia nervosa risk, but in-season wrestlers scored significantly higher on drive for thinness scales as compared to their non-wrestler counterparts. Although these results indicate that wrestlers may be more weight conscious than those not in the sport, these concerns appear to be characteristic of wrestlers only during the season (Dale & Landers, 1999). In turn, weight concerns in male wrestlers appear to be transient rather than a pervasive aspect of their lives. Still, the unhealthy weight control behaviors of wrestlers are well-documented in the literature (e.g., Aizawa et al., 2005; Hursch, 1979; Ribisl, 1975; Steen & Brownell, 1990).

Disordered eating in males from other sports is limited. In one study with 203 male collegiate athletes in a range of aesthetic (e.g., cheerleading), weight-dependent (e.g., wrestling),

ball (e.g., baseball), endurance (e.g., cross country), power (e.g., football), and technical sports (e.g., golf), Petrie et al. (2008) found that nearly 20% of their sample could be considered symptomatic of an eating disorder. In a qualitative study with male collegiate athletes in swimming, diving, lacrosse, football, baseball, golf, and skiing, Galli and Reel (2009) found that some male athletes experience body dissatisfaction and sociocultural pressures to maintain a certain figure. Risk for disordered eating has also been identified in elite male judoists and cyclists (Ferrand & Brunet, 2004; Filaire, Rouveix, Pannafieux, & Ferrand, 2007). Although females are most widely studied and considered more at risk, male athletes may not be exempt from poor body image and disordered eating habits. This may be especially true for those involved in aesthetic-based sports like figure skating, gymnastics, and cheerleading. Reel and Gill (1998) suggest that college male cheerleaders may face unique weight pressures, including a weight limit to try out and pressure for weight gain. However, research has not examined the presence and magnitude of body image distortions or disordered eating among male athletes in other aesthetic sports.

Competitive level. Studies consistently show that clinical and subclinical eating disorders exist in athletes competing at the high school (e.g., Nichols et al., 2006; Reel & Gill, 1996; Rosendahl et al., 2009), collegiate (e.g., Beals & Hill, 2006; C. Johnson et al., 1999; Reinking & Alexander, 2005; Sanford-Martens et al., 2005), and elite level (e.g., Sundgot-Borgen & Torstveit, 2004; Sundgot-Borgen & Torstveit, 2010; Torstveit et al., 2008). Unfortunately, few have examined the prevalence of disordered eating across competitive levels within a single study. However, preliminary evidence indicates that disordered eating may be more prevalent in higher level sports. For example, in a study of NCAA Division I and Division III athletes and non-athlete controls, those at higher competitive levels (i.e., NCAA Division I) showed more

signs of abnormal eating and were at greater risk for the development of a clinical eating disorder (Picard, 1999). These results suggest that higher performance standards and the stress associated with meeting those standards may be associated with greater concern for weight and body shape. However, more research is needed to support this claim.

Sport type. Given the emphasis on appearance, weight, and body shape in some sports, much of the literature has been devoted to comparing the prevalence of disordered eating among predominantly female athletes in “lean” or “aesthetic” versus “non-lean” or “non-aesthetic” sports. Lean/aesthetic sports have been defined as those that depend on appearance, weight, body shape, and/or leanness to achieve optimal performance and that require form-fitting or revealing uniforms (e.g., cross country, swimming/diving, rowing/crew, gymnastics, cheerleading, and figure skating). The terminology employed in the literature (i.e., lean, aesthetic) depends on the preference of the researchers and will be used interchangeably here.

A significant portion of the literature suggests that those in lean/aesthetic sports are more at risk for disordered eating than those in non-lean/non-aesthetic sports. For example, Reinking and Alexander (2005) compared 16 female collegiate lean sport athletes (i.e., swimming, cross country) with 68 female collegiate non-lean sport athletes (i.e., basketball, volleyball, softball, field hockey, soccer). Results indicated that lean sport athletes had a lower mean actual and desired body weight, greater body dissatisfaction and drive for thinness, and were more at risk for disordered eating as compared to their non-lean sport counterparts. Similar findings have been found in other studies (e.g., Davis & Cowles, 1989; Picard, 1999; Stoutjesdyk & Jevne, 1993; Sundgot-Borgen, 1993b). Hausenblas and Carron’s (1999) meta-analysis also revealed that the sub-group of athletes reporting the most symptoms of clinical and subclinical eating

disorders were those participating in sports that emphasize appearance, weight, or body shape (i.e., cross country, swimming/diving, rowing/crew, gymnastics, cheerleading, figure skating).

Interestingly, other studies reveal that lean and non-lean sport athletes do not differ on disordered eating and body image measures. For example, in an investigation of female collegiate athletes, athletes were classified as participating in endurance (i.e., $n = 51$; cross country, track, swimming), aesthetic (i.e., $n = 12$; cheerleading, gymnastics, synchronized swimming), power (i.e., $n = 15$; downhill skiing, crew/rowing), ball game (i.e., $n = 105$; basketball, softball, soccer, volleyball, field hockey, lacrosse), or technical sports (i.e., $n = 21$; tennis, golf). Although a substantial number of athletes reported symptoms indicative of clinical (2% of their sample) and subclinical eating disorders (25.5% of their sample), results revealed no association between sport type and eating disorder status (Greenleaf, Petrie, Carter, & Reel, 2009). Several other investigations revealed similar findings (e.g., Ashley et al., 1996; Bachner-Melman, Zohar, Ebstein, Elizur, & Constantini, 2006; Hausenblas & Downs, 2001; Sanford-Martens et al., 2005; Warren, Stanton, & Blessing, 1990).

Inconsistency in results across studies may in part be due to differences in sport classifications, small sample sizes when divided by sport type, and the measures used to identify clinical and subclinical eating disorder symptomatology. However, despite the equivocal nature of the literature comparing lean versus non-lean sports, many researchers have concluded that there is enough evidence to warrant concern for the risk of disordered eating in sports that emphasize appearance, weight, or body shape (Hausenblas & Carron, 1999). This concern is supported by the plethora of research conducted on lean/aesthetic sports in particular.

More specifically, sports categorized as lean or aesthetic have typically included cross country, swimming/diving, rowing/crew, gymnastics, and cheerleading. Systematic

investigations of female athletes participating in each of these sports indeed reveals that disordered eating behaviors and body image disturbances are noteworthy. For example, in an examination of 300 female collegiate cross-country runners, 19.4% reported having previous or current disordered eating habits (S. H. Thompson, 2007). In a study of 955 swimmers ages 9 to 18, 15% of the female sample ($n = 487$) reported frequently engaging in pathogenic weight control behaviors, including fasting, self-induced vomiting, laxatives, and diuretics (Dummer et al., 1987). Sykora, Grilo, Wilfley, and Brownell (1993) found that 20% of their sample of female rowers ($n = 73$) reported binge eating episodes twice a week, and 13% reported self-induced vomiting. Among 215 collegiate female gymnasts, over 60% met criteria for an intermediate form of disordered eating, and only 22% were categorized as having normal eating habits (Petrie, 1993). Finally, in an examination of 156 high school female cheerleaders, 46% reported that they were currently trying to lose weight, and 13% reported symptoms indicative of eating problems (S. H. Thompson & Digsby, 2004).

Each of these studies lacked a control group, which is a primary limitation in determining the risk of problematic eating attitudes and behaviors in lean/aesthetic sports. However, there has not been a single study to date that denies the presence of clinical and subclinical eating disorder symptomatology among lean/aesthetic sport athletes. In turn, the consequences and possible risk factors involved, especially for those competing in lean/aesthetic sports, warrant exploration.

Consequences of Disordered Eating

The physical and psychological consequences associated with clinical and subclinical eating disorders are numerous and well-documented. R. A. Thompson and Sherman (1993) note that some athletes engage in disordered eating habits with minimal long term ramifications. Others argue that prolonged pathogenic weight control behaviors and energy restriction will take

a physical and/or psychological toll over time (Beals, 2000). An overview of the primary health risks associated with disordered eating is provided. These include possibility for developing one or more components of the female athlete triad, as well as other physical complications, psychological problems, and performance decrements in both male and female athletes.

Female athlete triad. The female athlete triad is defined as the interrelationship between disordered eating, amenorrhea, and osteoporosis (Yeager, Agostini, Nattiv, & Drinkwater, 1993). Since the female athlete triad was officially defined, these components have since been broadened to include a full range of disordered eating behaviors, menstrual dysfunctions, and bone health concerns (Manore, Kam, & Loucks, 2007). The etiology of the female athlete triad follows a progressive pattern that typically begins with disordered eating and results in a cycle where each component is linked directly or indirectly to the other (Beals & Meyer, 2007). An overview of the physical and biological mechanisms behind the relationship between disordered eating, menstrual dysfunction, and poor bone health are discussed.

Disordered eating and menstrual dysfunction. Numerous hypotheses have been proposed as to how disordered eating predisposes athletes to menstrual dysfunction. However, the most well-supported explanation is the energy deficit hypothesis (Beals & Meyer, 2007). According to Harber (2000), maintaining enough fuel in the body to support the energy requirements of training is difficult for many athletes, especially when weight and body image are a concern. Prolonged caloric deficiency forces the body to allocate its energy on primary cellular processes to support survival while other processes, like depositing fatty tissue and developing reproductive functions, are largely jeopardized (Wade, Schneider, & Li, 1996).

Inadequate caloric intake is also believed to deprive the brain of important carbohydrates necessary for proper hormonal release (Loucks & Thuma, 2003). More specifically, the dynamic

interplay of various critical bodily processes during puberty are disrupted, including: the secretion of gonadotropin releasing hormone from the hypothalamus, the secretion of follicle stimulating and luteinizing hormones from the pituitary gland, the functioning of the ovaries, and subsequent production of estrogen and progesterone (Harber, 2000). In turn, a variety of menstrual dysfunctions can occur, such as luteal suppression (i.e., a shortened luteal phase), anovulation (i.e., absence of ovulation), oligomenorrhea (i.e., prolonged length of time between cycles), primary amenorrhea (i.e., absence of menses by the age of 14 or 16 depending on sexual maturity rating), and secondary amenorrhea (i.e., absence of menstruation following the onset of menarche) (Beals & Meyer, 2007).

Disordered eating and poor bone health. According to the National Institute of Health (2000), poor bone health can include a number of disorders ranging from low bone mineral density to osteoporosis, which is a severe disease characterized by skeletal degeneration and loss of bone strength. The processes by which bone health is affected are dynamic and complex. For example, when athletes engage in disordered eating behaviors such as restrictive dieting, they tend to consume far less than the recommended number of calories necessary to compensate for the energy expended in their sport (Caine, Bass, & Daly, 2003). The little energy that is available is believed to be devoted towards survival functions and sport training as opposed to proper growth and maturational processes (Borer, 2005). Borer (2005) contends that longitudinal growth in particular can be permanently or temporarily stunted with inadequate caloric intake.

In addition to overall energy consumption, poor calcium intake as a result of disordered eating practices is of particular concern because of its crucial role in bone health, growth, and mass (Haymes, 2003). Peak bone mass is not achieved until approximately the age of 30 and steadily decreases thereafter (Barr & McKay, 1998). Inadequate calcium intake during rapid

periods of growth therefore predicts poor bone health not only during childhood and adolescence but also throughout adulthood (Barr & McKay, 1998).

Poor bone health can also occur as a direct result of the absence or disruption of the menstrual cycle. Estrogen is a principal hormone in the suppression of cells responsible for bone resorption (i.e., breaking down bone). Irregular hormonal release, as a result of disordered eating, menstrual dysfunction or a combination, can lead to an increase in bone resorption and therefore a decline in bone quality (Beals & Meyer, 2007). Research demonstrates that missed menstrual cycles are indeed associated with significant and potentially permanent losses in bone mineral density (Drinkwater, Bruemner, & Chesnut, 1990; Keen & Drinkwater, 1997; Lloyd, Meyers, Buchanan, & Demers, 1988). Individuals with menstrual dysfunction are at risk for premature osteoporosis and poor bone health over the lifespan (Hurvitz, 2009).

The cyclical nature of the female athlete triad and the associated health risks warrant attention and concern. Given that the female athlete triad typically begins with disordered eating, understanding this phenomenon in female athletes, particularly those in lean/aesthetic sports, is critical. A discussion of the additional physical, psychological, and performance implications of disordered eating further support this need.

Other physical consequences. In the absence of the female athlete triad, disordered eating behaviors are associated with a number of other physical ramifications in both males and females. Serious medical complications from clinical eating disorders can involve multiple body systems including orofacial (e.g., dental caries), cardiovascular (e.g., unusually slow heart rate), gastrointestinal (e.g., abnormal liver function), endocrine (e.g., hypoglycemia), renal (e.g., kidney stones), reproductive (e.g., infertility), integumentary (e.g., hair loss), neurologic (e.g.,

damage to the peripheral nervous system), and hematologic systems (e.g., anemia) (Becker et al., 1999). Disordered eating can transform into a pervasive and whole body disease.

In addition to a range of medical complications, clinical eating disorders are also associated with death. In a systematic review of the outcomes of disordered eating, the literature suggests that the mortality rates for anorexia nervosa tend to be higher than those for other eating disorders, including bulimia and EDNOS (Berkman, Lohr, & Bulik, 2007). However, more recent data show that mortality rates may be similar across clinical eating disorder types. For example, in a longitudinal examination of mortality over 8 to 25 years in nearly 2,000 individuals who sought treatment at a specialized eating disorders clinic, crude mortality rates were 4% for anorexia nervosa, 3.9% for bulimia nervosa, and 5.2% for EDNOS. Causes of death included suicide, substance-related death, traumatic incident, and medical complications (Crow et al., 2009). Although bulimia nervosa and subclinical eating disorders are often considered to be less severe than anorexia nervosa, research clearly demonstrates that all are cause for concern.

Indeed, subclinical forms of eating disorders pose many health risks. Beals (2000) and Otis (1998) summarize the primary consequences of unhealthy weight control behaviors. For example, these authors report that the common side effects of diet pills can include rapid heart rate, anxiety, poor concentration, insomnia, and dehydration. The excessive use of diuretics, laxatives, enemas, self-induced vomiting, and saunas can all result in dehydration and electrolyte imbalances. Excessive exercise increases the risk for overuse injuries, while fat-free diets and other restrictive eating practices may result in inadequate consumption of important macro and micronutrients necessary for healthy body function (Beals, 2000; Otis, 1998). Prolonged malnutrition can result in chronic fatigue, delayed healing and injury recovery, endocrine abnormalities, and decreased immune function (Brownell et al., 1987). Research also suggests

that weight loss in elite female athletes is associated with a significant reduction in oxygen consumption (Ingjer & Sundgot-Borgen, 1991).

Psychological disturbances. The psychological disturbances that characterize disordered eating are numerous, including an intense preoccupation with weight and body shape and excessive fears of becoming fat (American Psychiatric Association, 2000). Other psychological disturbances may promote, worsen, or precede disordered eating attitudes and behaviors. For example, according to the DSM-IV-TR, anorexia nervosa is often comorbid with a range of additional psychological features and disorders (American Psychiatric Association, 2000). These can include symptoms of depression (e.g., depressed mood, social withdrawal, irritability, and insomnia), obsessive compulsive features (e.g., preoccupation with food, hoarding food or recipes), personality disorders, substance abuse problems, and suicidal ideation. Bulimia nervosa is similarly associated with depressive symptoms, substance abuse problems, personality disorders, and anxiety (American Psychiatric Association, 2000). Those with subclinical eating disorders are also at risk for psychological disturbances. For example, adolescent girls with subclinical forms of anorexia nervosa, bulimia nervosa, or binge eating disorder (currently an EDNOS classification) were found to additionally suffer from a range of mood and anxiety disorders, including major depression, dysthymia (i.e., depressed mood for at least two years), generalized anxiety disorder, and separation anxiety (Touchette et al., 2011).

Several researchers (e.g., Sundgot-Borgen, 2002; R. A. Thompson & Sherman, 1993) have summarized a number of other psychological and behavioral characteristics found in athletes with disordered eating. These can include secretive eating or avoidance of eating situations, self-criticism about being fat despite being thin, difficulty relaxing, and abnormal preoccupation with weight or shape (e.g., excessive weighing, refusal to weigh). Eating-

disordered athletes may also be resistant to seek professional help, inflexible in their food and exercise regimens, and exercise while injured (Sundgot-Borgen, 2002; R. A. Thompson & Sherman, 1993). Although clinical eating disorders tend to have the most detrimental effects, the consequences of even a single disordered eating behavior can put the health of athletes at risk.

Performance implications. Unfortunately, little is known about the long-term effects of disordered eating on athletic performance because of the difficulty in closely monitoring athletes longitudinally and eliminating confounding factors (Beals & Manore, 1994). However, based on what is known about the impact of energy deficiency and dehydration on the body, it is assumed that disordered eating has a negative impact on performance. The degree to which performance is affected may be a function of the severity and duration of the disordered eating behaviors and the nature of the sport (Sundgot-Borgen, 2002). In a review article, Fogelholm (1994) outlines the major physical implications on performance as a result of body weight reduction in athletes. These include potential dehydration, energy loss, a decline in muscle strength and aerobic capacity, and stress on the endocrine system.

Psychological factors associated with disordered eating behaviors may also result in performance decrements. Perceived interpersonal evaluation regarding one's physique is associated with cognitive anxiety and is the basis of the social physique anxiety construct (Hart, Leary, & Rejeski, 1989). Such anxiety may be similar to other chronic experiences of sport-specific and general life stress that have been shown to be related to poorer athletic performance (Felsten & Wilcox, 1993). Other research shows that rapid weight loss is related to temporary declines in mood and memory impairments in wrestlers (Choma et al., 1998). Similarly, rowers with disordered eating habits and poor body image perceptions show symptoms of depression,

confusion, and tension (Terry et al., 1999), all of which may impact short and long term performance outcomes.

Despite the range of possible physical and psychological implications, many athletes with disordered eating are able to maintain and enhance athletic performance. Although this phenomenon has not been examined empirically, researchers have hypothesized that the psychological characteristics that are associated with and predispose athletes to certain disordered eating behaviors may allow them to perform in the face of physical and emotional exhaustion. For example, R. A. Thompson and Sherman (1993) postulate that the psychological components of disordered eating, such as being driven by fear, anxiety, guilt, compulsiveness, and perfectionism, may enable athletes to function even under physiological duress. In an effort to lose weight, some athletes may abuse substances that are also stimulants, such as diet pills, caffeinated diuretics (e.g., coffee, tea), and diet caffeinated soft drinks, which may also sustain performance (R. A. Thompson & Sherman, 1993). Although temporary performance enhancements may be observed, chronic and severe disordered eating behaviors are believed to present a number of challenges as previously described.

Risk Factors for Disordered Eating in Sport

Athletic participation is related to disordered eating in some male and female athletes. Although the nature of this relationship is not fully understood, a number of possible risk factors have been identified. These include social pressures, specific features and requirements of sport, and psychological characteristics typical of many successful athletes.

Social pressures. Many females in general experience anxiety over their body shape and weight and engage in unhealthy behaviors in an attempt to meet cultural standards. In a sample of 114 young adult females, Stice (1998) found that social reinforcement of the thin-ideal from

family, peers, and the media predicted the onset of binge eating and purging. A longitudinal study of 219 adolescent girls revealed that those characterized by a perceived pressure to be thin, low body satisfaction, and poor social support were adversely affected by prolonged exposure to fashion magazines. More specifically, they experienced an increase in negative affect, body dissatisfaction, dieting, and bulimic symptoms (Stice et al., 2001). The impact of the thin-ideal on women and girls across Western culture is indeed pervasive.

Research suggests that female athletes face the same sociocultural demands as their non-athlete counterparts. In a qualitative investigation of 21 female collegiate varsity athletes on the negotiation between femininity and athleticism, results revealed that athletes perceived the ideal female image as “small, thin, and model-like” (Krane, Choi, Baird, Aimar, & Kauer, 2004, p. 326). Although these athletes recognized that strength and sufficient caloric intake were necessary to sustain them in their training, they also noted that musculature and eating larger amounts of food were not feminine. Krane et al. (2004) concluded that media portrayals of the thin-ideal may predispose female athletes to an unhealthy body image, disordered eating behaviors, and identity confusion between femininity and athleticism.

In addition to sociocultural demands, female athletes also experience pressure to enhance performance and conform to the aesthetic requirements of their sport (Beals & Manore, 1994). Researchers have therefore hypothesized that female athletes, particularly those in sports that emphasize leanness and appearance, experience twice as much pressure as their non-athlete peers to control weight and body shape. Within the sport environment, one of the most significant sources of pressure is coaches (e.g., Kerr et al., 2006; Sundgot-Borgen, 1994). In a sample of 42 collegiate female gymnasts, Rosen and Hough (1988) found that nearly 70% reported that their coaches told them they were too heavy. The majority of those who received a disparaging

comment from their coach reported resorting to a pathogenic weight control behavior (Rosen & Hough, 1988). The researchers made significant conclusions about the athletic environment based on their findings:

Comments from someone critically important in an athlete's life, someone whom the athlete always wishes to please, carry much weight. When these comments focus on a highly sensitive issue, they can devastate an athlete. Telling a gymnast she is too fat or praising her for losing excess weight, without investigating the means by which she has lost the weight, can easily initiate and solidify an overt eating disorder (Rosen & Hough, 1988, p. 144).

Additional studies show that other important figures in the athletic environment such as judges, audience members, and teammates (e.g., Doughty & Hausenblas, 2007) also play a significant role in the development of disordered eating behaviors in female athletes.

Little is known about the sources of pressure for male athletes who engage in similar unhealthy weight control habits. Preliminary evidence suggests that weight pressures from teammates and coaches are more salient than appearance-based weight pressures in collegiate male athletes (Galli, Reel, Petrie, Greenleaf, & Carter, 2011). However, these pressures may vary by sport type. Galli et al. (2011) found that ball game athletes (e.g., basketball, soccer, hockey) reported less appearance-based weight pressures than both endurance (e.g., cross-country, swimming) and power sports (e.g., football, downhill skiing). In addition, power athletes perceived more weight pressures from teammates and coaches than both ball game and endurance athletes (Galli et al., 2011). Other qualitative findings corroborate the notion that male collegiate athletes believe that pressures from important others (e.g., friends, teammates, family) and the sociocultural environment influence their body image (Galli & Reel, 2009).

Specific features and requirements of sport. In addition to social influences, other reported sources of pressure regarding weight and appearance involve inherent features and requirements specific to sport. For example, in an investigation of high school and collegiate female cheerleaders, the most commonly reported source of pressure relative to body weight was wearing revealing uniforms (Reel & Gill, 1996). Benson and Taub (1993) and Reel (2001) contend that the same may be true of female swimmers. Other evidence suggests that skill requirements may be a source of pressure as well. More specifically, Black (1991) argues that the ease of being lifted (e.g., in partner stunts and pairs lifts) is influenced by weight. In turn, female athletes may experience pressure to be thinner and lighter in order to execute the difficult lifting skills required by sports like figure skating and cheerleading (Monsma, 2008; Reel & Gill, 1996). Although not widely explored, weight pressures among male athletes in sports like pairs skating or ice dancing deserve further exploration. Stressors associated with body weight, size, and appearance may become a concern for those male pair skaters or ice dancers who must find a balance between building size and strength to lift their partner and maintaining leanness and linearity for aesthetic purposes. More systematic research is needed to fully understand how specific sport features impact both male and female athletes' perceptions of their bodies and eating habits.

Psychological characteristics. Some researchers postulate that the psychological qualities that contribute to being a successful athlete may also make athletes vulnerable to disordered eating. These characteristics include striving for perfection, compulsiveness, self-discipline, motivation, willingness to tolerate pain, and desire to please (M. D. Johnson, 1994; R. A. Thompson & Sherman, 1993). Low self-esteem, high appearance orientation, exercising to be attractive and improve appearance (Petrie, Greenleaf, Reel, & Carter, 2009), and social physique

anxiety (Haase, 2009; Monsma & Malina, 2004) have been shown to predict disordered eating in female samples. In a review of disordered eating in sport, Petrie and Greenleaf (2007) describe a number of psychosocial predictors of disordered eating in non-athlete and athlete populations, including sport pressures, societal pressures, internalization of the thin ideal, poor physical self-perceptions, body dissatisfaction, perfectionism, and neuroticism. To advance the literature on disordered eating in athletes, Petrie and Greenleaf call for future research to establish the presence and relationship between possible risk factors in sport.

Unfortunately, a causal relationship between sport participation and disordered eating cannot be deduced from the extant literature. Athletes who already possess specific psychological characteristics that make them vulnerable to disordered eating may self-select into sport. For others, sport participation may foster disordered eating behaviors (R. A. Thompson & Sherman, 1993). However, the strong association between disordered eating and the sport context is indeed notable and should be considered in research examining the development of disordered eating in both male and female athletes.

Figure Skating

Of the lean sports that have been examined because of their emphasis on appearance, weight, and body shape, figure skating has been largely understudied. Although a plethora of anecdotal evidence suggests that figure skaters are at risk for the development of clinical and subclinical eating disorders, the scale and scope as well as the nature of disordered eating in this population is not fully understood. The extant literature surrounding the topic of disordered eating in figure skating is discussed, including what is known about the subculture, nutritional and physiological status, and weight and body image concerns among this population of athletes.

Figure skating subculture. Characterized by a pattern of traditions and behaviors that distinguish it from other sports, figure skating is believed to have its own subculture. Illustrations of the figure skating subculture have been depicted through numerous anecdotal accounts. Exploratory investigations in the sport sociology and sport psychology literature have also provided insights into key aspects of the figure skating environment and tend to corroborate the testimonial evidence. These include ethnographic and qualitative studies examining the figure skating experience as well as sources of stress and enjoyment. Together, all sources of knowledge allude to pressures that may be associated with disordered eating in this population.

Little research has systematically examined the figure skating subculture. However, the few exploratory studies conducted in this area point to several common themes in the skating experience and tend to mirror anecdotal accounts described in Chapter I. Using ethnographic methodologies, Grenfell and Rinehart (2003) conducted 40 hours of structured observation (e.g., noting non-verbal behavior, language, and implied criticism or praise) and in-depth qualitative interviews with female figure skaters, parents, and club officials. Given the subjective nature of the research design and the sensitivity of the topic, results were presented in fictionalized amalgams or stories to depict the intricacies of the subculture observed in a real life form.

Grenfell and Rinehart (2003) identified a number of psychosocial variables apparent in female figure skating participants. These included perfectionism (i.e., multiple coaches required to dissect a skill and perfect each component), hostility (i.e., jealousy and use of intimidation among skating peers), performance (i.e., maintaining a composed and graceful exterior despite internal turmoil), and the learned importance of appearance (e.g., using color, make-up, and material to enhance acceptable physical features and de-emphasize less desirable ones). Grenfell and Rinehart also described the apologetic nature of the figure skaters observed and the apparent

shame and guilt associated with performance mistakes. The researchers concluded that young elite female figure skaters are allotted little autonomy, indebted to the adults managing their skating regimen (e.g., through the time, energy, and finances invested), and thus trapped within the sport without adequate understanding for another way of being in the world.

Cummins (2007) identified similar aspects of figure skating that appear to distinguish it from other sports. These included the isolating nature of an individual sport where figure skaters are solely responsible for performance outcomes, training demands that far exceed those of other youth team sports (e.g., 15 to 20 hours per week without an off-season), and tremendous financial and social sacrifices. Cummins hypothesized that figure skaters may encounter identity struggles because, based on Marcia's (1966) identity status theory, they have foreclosed early on being and becoming an elite level figure skater. Identity confusion may be a particular concern when figure skaters experience biological and pubertal changes that can negatively impact performance and lead to a decline in athletic competence.

Other qualitative studies have specifically examined the sources of stress associated with being a figure skater. For example, using semi-structured qualitative interviews, Gould, Jackson, and Finch (1993) examined the major sources of stress in 17 male and female Senior US National Champion figure skaters who held titles between 1985 and 1990 (18 to 33 years of age). Sources of stress included self-imposed standards of perfectionism, meeting the expectations of others, social comparison with skating peers, skating politics, interpersonal conflict (e.g., parents, coaches, skating peers, sponsors), and struggling to obtain a sense of independence and personal identity. Other figure skaters noted that maintaining weight and appearance was a major source of stress, particularly for the females in the study. Several figure skaters reported behaviors

symptomatic of bulimia nervosa and other forms of disordered eating. The researchers quoted one figure skater's account of her struggle with weight:

You should do a whole story on weight in figure skating; it is such an appearance sport. You have to go up there with barely anything on...It's not like I'm really skinny or anything, but I'm definitely aware of it. I mean I have dreams about it sometimes. So it's hard having people look at my thigh and saying, 'Oops, she's an eighth of an inch bigger,' or something. It's hard...Weight is continually on my mind. I am never, never allowed to be on a vacation. Weight is *always* on my mind (p.149).

Scanlan, Stein, and Ravizza (1991) conducted a similar study on the sources of stress in 29 former elite male and female figure skaters who had competed at the national championship level (29 to 49 years of age). Similar to Gould et al. (1993), weight management and scrutiny from others regarding weight and body size emerged as significant stressors. The notion that weight concerns emerged from the abovementioned qualitative data without obvious interview prompts demonstrates the saliency of these types of issues in figure skaters.

Other studies have examined perceived sources of enjoyment in figure skaters of varying ages. Ryba (2007) examined eight male and female youth figure skaters between 8 and 10 years of age through qualitative interviews. Results revealed that young figure skaters most enjoyed accomplishing skills for the first time, getting better, being creative, and interacting with others. Interview data also yielded results on the early importance of the body in figure skating. More specifically, awareness of the body as "weightless," "stretched" and/or "right" emerged from the analyses (Ryba, 2007, p. 67).

Sources of enjoyment have also been examined in older figure skaters. Scanlan, Stein, and Ravizza (1989) conducted qualitative interviews with 26 former male and female national

championship competitors (ages 22 to 49). Similar to the youth figure skaters in Ryba's (2007) study, a sense of accomplishment, learning and improving skills over time, creativity, and social opportunities similarly emerged as significant sources of enjoyment. Interestingly, although elite participants cited the act of figure skating as pleasurable, they did not recognize experiencing the body as a source of enjoyment as did the youth participants in Ryba's investigation. These results have important implications for understanding how some figure skaters shift from body enjoyment in youth to body distress at the elite level.

Although not extensive, the exploratory literature provides important insights into the perceived positive and negative aspects that shape the figure skating experience. The emphases on weight and body shape, high standards, and other factors described may foster an environment that promotes or worsens disordered eating attitudes and behaviors.

Nutritional and physiological status of figure skaters. The anecdotal and preliminary research findings describing the nature of the figure skating experience have sparked a line of research on their nutritional and physiological status. Ziegler and colleagues in particular have spearheaded the research on possible abnormalities in energy consumption in this population. For example, Ziegler, Khoo, Kris-Etherton, et al. (1998) assessed the nutritional status of 34 adolescent male and female figure skaters who were nationally ranked in the US. Each figure skater completed a four-day diet record and participated in a series of anthropometric and biological assessments. Results showed that figure skaters reported lower intake of important food groups (e.g., fresh fruits and vegetables, meat, fish, poultry, eggs, and milk products) and micronutrients (e.g., Vitamin D, Vitamin E, calcium, magnesium, and zinc) than other adolescents in the US. Researchers concluded that both male and female elite adolescent figure skaters may be vulnerable to poor nutrition as compared to their same age peers.

Ziegler et al. (1999) later expanded this sample to 41 adolescent male and female figure skaters who were nationally ranked in the US. In addition to the four-day diet records and the anthropometric and biological measures previously employed, these researchers conducted a more comprehensive assessment by also administering the Eating Attitudes Test (EAT). This self-report measure is intended to examine eating attitudes and behaviors that resemble those individuals with anorexia nervosa (Garner, Olmsted, Bohr, & Garfinkel, 1982; Ocker, Lam, Jensen, & Zhang, 2007). Similar to previous findings (i.e., Ziegler, Khoo, Kris-Etherton et al., 1998), the results of this study revealed nutritional deficiencies in elite adolescent figure skaters as compared to other adolescents in the US. Figure skaters also consumed far fewer calories than the recommended dietary intake based on age, sex, and weight. In review of the EAT scores, the researchers concluded that figure skaters may be at risk for the development of eating disorders, but did not provide descriptive or inferential statistical analyses to support this assumption.

Additional findings corroborate the notion that elite figure skaters may not be consuming enough calories and micronutrients from the recommended food groups to sustain their activity (Ziegler, Nelson, Barratt-Fornell, Fiveash, & Drewnowski, 2001) and may be starting their day with low energy reserves due to inadequate breakfasts (Ziegler, Jonnalagadda, Nelson, Lawrence, & Baciak, 2002). Low energy intake and nutritional deficiencies are especially concerning when figure skaters already have lean figures and low body fat percentages (e.g., average male 5.8%; average female 12.5%) (Coleman, 2000; Ziegler et al., 1999). Suboptimal nutrition has also been identified in non-elite figure skaters (i.e., test stream athletes rather than national level performers). In an investigation of 13 non-elite female figure skaters (17 to 19 years), Delistray, Reisman, and Snipes (1992) found that although the skaters in their sample

trained less than elite figure skaters in other studies, they had similar nutritional profiles with reported carbohydrate, calcium, and iron intake insufficient for fitness and performance.

Later research alludes to potential sex differences in dietary intake among elite figure skaters. Ziegler, Jonnalagadda, and Lawrence (2001) examined seven elite ice dancing pairs (ages 17 to 26). Although the male ice dancers appeared to have normal energy intake, the female ice dancers had energy intakes that were significantly lower than the dietary recommendations. The researchers concluded that female ice dancers may not be consuming enough energy for performance as well as important micronutrients important for bone health. Sex differences were also identified in a sample of 159 male and female elite figure skaters (ages 12 to 28) (Ziegler, Nelson, Tay, Bruemmer, & Drewnowski, 2005). Results revealed that females were less likely to eat fast foods and more likely to substitute diet soda for regular soda and consume fruits, vegetables, and bagels when compared to males. The researchers did not provide possible explanations for these discrepancies. However, it can be argued that female figure skaters may be far more weight conscious than their male counterparts in order to achieve the petite and lean body shape desirable among female participants. This may be especially true for female pair skaters and ice dancers who must be lifted by their partner (Monsma, 2008).

Other sex differences have been observed in the supplement use of figure skaters. Ziegler, Nelson, and Jonnalagadda (2003) found that 65% of males and 76% of females in their sample reported using supplements, including multivitamins, herbal supplements, creatine, and energy drinks. Interestingly, 28% of the female figure skaters reported that they use supplements to make up for an inadequate diet, which was not a primary reason for males.

In review of the findings on nutritional status across studies, elite figure skaters may be at risk for greater nutritional and energy deficiencies than their adolescent counterparts, especially

females. However, although valuable, the aforementioned literature poses several limitations. The majority of the studies focused solely on elite level figure skaters. In turn, little is known about the nutritional intake of those at other lower competitive levels (e.g., those who compete locally or regionally). In addition, although the dietary and physiological perspective is important, this line of research speaks little as to why elite figure skaters are consuming inadequate amounts of energy and if disordered eating and body image disturbances are indeed present in this population. Other research has attempted to more closely address these questions.

Disordered eating, body image, and weight concerns in figure skaters. Some studies have more directly examined disordered eating, body image, and weight concerns in figure skaters. To adequately organize the literature in this area, the following section will be discussed in three parts: (a) the prevalence of clinical and subclinical eating disorders in figure skaters; (b) weight loss techniques and perceived weight pressures among figure skaters; and (c) physical, psychological, and contextual correlates of disordered eating in figure skaters.

Prevalence of disordered eating, body image, and weight concerns in figure skaters. Preliminary studies suggest that figure skaters exhibit disordered eating attitudes and behaviors. For example, Barkley (2001) examined 67 male and female competitive figure skaters (i.e., ages 12 and over who had competed at the regional, sectional, or national level at least two times within the last two months) from a North-Atlantic training facility using the Eating Disorder Inventory-2 (EDI-2). The EDI contains 64 self-report questions with three subscales designed to examine attitudes and behaviors associated with eating, weight, and body shape (i.e., drive for thinness, bulimia, body dissatisfaction) and five subscales designed to examine a range of psychological constructs associated with eating disorders (i.e., ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, maturity fears) (Garner & Olmsted, 1984; Garner,

Olmsted, & Polivy, 1983). The EDI-2 adds 27 new items into three provisional scales, including asceticism, impulse regulation, and social insecurity (Garner, 1991). Using this measure, none of the figure skaters met full criteria for a clinical diagnosis of anorexia nervosa. However, 27% of the female figure skaters ($n = 49$) reported preoccupation with weight, and 37% reported a drive for thinness (Barkley, 2001). These results suggest that subclinical rather than clinical features may be the predominant form of disordered eating in competitive figure skating.

Studies employing a range of other measures also suggest that disordered eating attitudes and behaviors are a concern among figure skaters. Rucinski (1989) assessed the body image and dietary intake of 17 male and 23 female national-level figure skaters (13 to 26 years of age) using the Eating Attitudes Test (EAT-40) – a self-report measure examining attitudes and behaviors that resemble those with anorexia nervosa (Garner et al., 1982; Ocker et al., 2007). Results revealed that 48% had EAT scores greater than or equal to 30, which is considered within anorexic range (Rucinski, 1989). Using body silhouettes (i.e., images depicting various body sizes) (Tehard, Van Liere, Com-Nougue, & Clavel-Chapelon, 2002) to examine body image perceptions of 49 elite figure skaters, Jonnalagadda, Ziegler, and Nelson (2004) found that their female sample ($n = 26$) indicated a greater preference for a thinner body contour and had greater body dissatisfaction scores than their male figure skating counterparts. Seventy-seven percent of the female sample also reported being terrified of gaining weight (Jonnalagadda et al., 2004). In sum, the available literature strongly suggests that figure skaters may be at risk for disordered eating and poor body image perceptions.

However, the relationship between eating attitudes and eating behaviors in figure skaters is not fully understood. Although they tend to be both lighter and leaner than other female athletes and most closely fit the thin ideal, they also have more negative attitudes towards eating

(Brooks-Gunn, Burrow, & Warren, 1988). These maladaptive eating attitudes have been shown to be negatively related to energy intake in figure skaters (Rucinski, 1989), which suggests that thoughts and feelings around eating have a definitive impact on eating behaviors in this population. Interestingly, other research indicates that figure skaters may diet even in the absence of negative eating attitudes. In an investigation of 40 nationally ranked junior figure skaters (12.9 to 22.9 years), 80% of the females ($n = 20$) reported being under or just the right weight, and 60% were satisfied with their body shape. Still, the majority of the females reported a desire to lose weight, and the prevalence of dieting for weight loss purposes was greater than that in the general young adult population (Ziegler, Khoo, Sherr et al., 1998). Dieting may therefore be a normative aspect of the figure skating subculture even in the absence of extreme body dissatisfaction.

In contrast to the abovementioned research, one study did not support the assumption that female figure skaters possess and/or are susceptible to disordered eating. In an examination of 21 competitive female figure skaters (11 to 16 years), mean EAT-40 scores were 14.4 (range 6 to 32), which is well below the 30 point cut-off score indicative of eating disorder risk (Ziegler, Hensley et al., 1998). These results may be due to differences in the competitive level of the skaters in this sample as compared to those in previous studies. Unfortunately, specific information on the competitive level of this sample of figure skaters was not provided.

The majority of research suggests that disordered eating attitudes and behaviors are a concern for female figure skaters, particularly at advanced levels of competition. Although not always clinical in nature, symptoms of disordered eating are present. However, limited research in this area, little use of control groups, minimal between-group comparisons across skating

discipline, competitive level, and sex, as well as mixed findings make precise prevalence estimates difficult.

Weight loss techniques and perceived pressures among figure skaters. Other research has specifically examined the weight loss techniques of figure skaters, as well as the perceived sources of pressure within the figure skating environment. In a descriptive study, Zatalan and Zatalan (2003), assessed 32 Canadian female pair and dance skaters (16 to 22 years of age) using the SKATE scale. This measure is an 18-item self-report survey designed to assess weight control behaviors as well as perceived pressures specific to the sport of figure skating (e.g., pressures for weight loss from parents, coaches, judges, skating partners, and self). The most frequently cited weight loss techniques included excessive exercise (74%), fasting/dieting (67%), vomiting (32%), diet pills (30%), and all of these methods combined (14%). Nearly the entire sample believed that there are pressures associated with figure skating to lose or maintain weight. Seventy-eight percent believed that their required skating attire made them conscious about their body appearance, and 36% reported that they received pressure from their figure skating peers to engage in weight control techniques. Interestingly, the greatest perceived source of stress to lose or maintain weight was from the figure skater herself, followed by coaches, parents, partners, and judges (Zatalan & Zatalan, 2003).

In a similar study, Taylor and STE-Marie (1999; 2001) examined eating disorder symptoms in 41 Canadian female pair and dance skaters (16 to 22 years of age) using the EDI. Simple sample *t*-tests were used to examine comparisons between EDI scores for figure skaters, an eating disordered population, and a normal college female sample. The researchers also developed two self-report questions to determine weight loss techniques used (e.g., fasting, dieting, vomiting) and whether figure skaters believed that pressures to lose or maintain low

weight are associated with their sport. EDI scores for the figure skaters showed greater similarity to the eating disordered population than the normal college female sample. All of the figure skaters reported that they had engaged in at least one weight control behavior during their skating career, and 92.7% believed that their sport was associated with pressures to lose or maintain weight. Similar to findings by Zatalan and Zatalan (2003), the greatest source of perceived stress was from themselves, followed by the coach. Interestingly, those who placed the most pressure on themselves to lose or maintain weight also perceived the greatest amount of stress from outside sources (e.g., coaches) (Taylor & STE-Marie, 1999, 2001). These results suggest that figure skaters may learn and internalize pressure from outside sources and in turn perceive that much of their stress is self-induced.

Interestingly, there may be fewer perceived pressures to lose or maintain weight for some figure skating sub-groups. For example, Greenleaf (2004) explored weight pressures and social physique anxiety in 86 female collegiate synchronized skaters (18 to 24 years of age) using the SYNCHROSKATE (an adapted version of the SKATE scale) and the Social Physique Anxiety Scale (SPAS-12) – a 12-item self report inventory used to measure anxiety levels experienced when one perceives that others are negatively evaluating his or her body shape. Results revealed that synchronized skaters only experienced moderate weight pressures from their skating environment and moderate levels of social physique anxiety. In contrast, Ziegler, Kannan, et al. (2005) assessed body image perceptions and weight concerns in 123 female international synchronized skaters in the US (mean age 17 ± 2.1 years). Only 45% of the skaters reported never having changed their eating behaviors for the purpose of weight management. The majority of skaters reported wanting to achieve a thinner body contour and be lighter than their current weight. As indicated by the percentage of scores above the mean, many of the skaters

were also fearful of gaining weight (60%), felt out of control when eating (61.8%), and were dissatisfied with their body shape (56.1%) (Ziegler, Kannan et al., 2005).

Result discrepancies between studies conducted by Greenleaf (2004) and Ziegler, Kannan, et al. (2005) may be due to differences in the measures used as well as the competitive level of the athletes involved. More specifically, weight pressures and risk for disordered eating may increase with competitive level, even for female synchronized skaters who may show few initial signs of perceived weight pressures and body anxiety. This would be in line with preliminary research suggesting that figure skating favors lightness, leanness, greater mesomorphy (i.e., leaner, muscular), and lower endomorphy (i.e., softer, rounder) at more elite levels, especially for dance and pair skaters (Monsma & Malina, 2005).

Correlates of disordered eating in figure skaters. Recent research has begun to examine the intersection of physical, psychological, and contextual variables associated with disordered eating in figure skaters. For example, Monsma, Malina, and Feltz (2006) examined the interaction of biological maturation, physical self-perceptions, and social physique anxiety in 113 competitive female solo, dance, and pair skaters across skating clubs in the US and Canada (12.8 to 22.3 years of age). Instruments included the Physical Self-Description Questionnaire (PSDQ) containing 70 self-report items on global physical self-concept and self-esteem (Marsh, 1996; Marsh, Richards, Johnson, Roche, & Tremayne, 1994) and a 9-item version of the Social Physique Anxiety Scale (SPAS-9) (Martin, Rejeski, Leary, McAuley, & Bane, 1997). A series of biological measures were also taken, including somatotype, body mass index (BMI), leg length, and age of menarche. Results showed that menarche, menstrual status, and somatotype were stronger correlates of physical self-perceptions than age. More specifically, older, postmenarcheal, and endomorphic (i.e., rounder, softer) figure skaters reported heightened

concerns about their body fat while their ectomorphic (i.e., lighter, leaner) counterparts indicated more positive physical self-perceptions. Social physique anxiety was the strongest predictor of physical self-perception, increasing with endomorphy (i.e., rounder, softer) and decreasing with ectomorphy (i.e., lighter and leaner) (Monsma et al., 2006). These results suggest that as female figure skaters enter puberty and physically mature, those who no longer fit the desired body type as defined by their sport's subculture may be susceptible to a poor physical sense of self.

Using similar instrumentation, Monsma and Malina (2004) examined the eating disorder risk of 114 competitive female figure skaters (12.8 to 22.3 years of age). Hierarchical stepwise regression analyses were used to compare a range of physical and psychological variables (as measured by the PSDQ, SPAS, and a number of anthropometric assessments) in predicting disordered eating attitudes and behaviors (as measured by the EDI). Results showed that body mass index (BMI) was the strongest predictor of EDI subscales with greater BMI being associated with greater EDI scores. Other predictors of disordered eating attitudes and behaviors included changes in physical characteristics associated with growth and maturation, social physique anxiety, and poor physical self-perceptions (Monsma & Malina, 2004). In a later study, Monsma (2008) found that solo figure skaters reported greater health and sport competence scores than partner skaters. She postulated that perceived pressure from a skating partner as well as the belief that they are recruited for aesthetic purposes rather than athletic ability may influence health and sport competence perceptions.

The literature on physical, psychological, and contextual correlates of disordered eating among figure skaters is in its early stages. Moreover, a thorough examination of emotional correlates of disordered eating in these athletes is virtually non-existent. One study has assessed the relationship between emotional self-appraisal and body image dissatisfaction in skaters.

Specifically, Ziegler, Kannan et al. (2005) found that elite female synchronized skaters who rated themselves as being depressed, lonely, sad, or unable to control events in their lives were more dissatisfied with their current body shapes. Emotional predictors as well as additional physical, psychological, and contextual variables are critical in future investigations.

Gaps in the Literature

Disordered eating in figure skating is a complex phenomenon that deserves ample empirical attention. Unfortunately, the literature in this area is relatively sparse. Fewer than 15 studies have specifically examined disordered eating, body image, or weight concerns in this population, and most were primarily descriptive. Approximately 15 other studies have provided important insights into the figure skating subculture and the nutritional and physiological status of skaters, but do not directly examine the complexities of disordered eating.

Of the small amount of attention that figure skaters have received, much of the research has focused on those competing at the elite level. Despite comprising the majority of the figure skating world, little is known about disordered eating in sub-elite figure skaters who are committed to their sport but do not compete nationally or internationally. Disordered eating in male figure skaters has been largely overlooked in the literature. Specific psychological predictors of disordered eating in this population have also not been adequately explored. From a methodological perspective, most of the studies conducted on disordered eating, body image, and weight concerns in figure skaters have included samples less than 50, and only a few have included more than 100 skaters. Without larger sample sizes, making meaningful comparisons across groups is difficult.

Study Purposes and Aims

As previously described, much of the research on disordered eating among figure skaters has focused on elite level females. Therefore, the primary aim of this study was to first examine disordered eating among those competing at the sub-elite level (i.e., those who have never competed nationally or internationally). Specifically, the primary purposes were to (a) assess the frequency of disordered eating attitudes and behaviors in female sub-elite figure skaters; (b) describe the psychological characteristics of female sub-elite figure skaters, including body dissatisfaction, perceived weight pressures, self-esteem, perfectionism, and athletic identity; (c) examine possible contributors to disordered eating attitudes and behaviors in female sub-elite figure skaters; and (d) gain a preliminary understanding of the role of figure skating in shaping body image, eating, and exercise habits in female sub-elite figure skaters.

The secondary aim of this study was to address a series of questions with other sub-groups of skaters pending the appropriate sample sizes were obtained. These secondary purposes were to (a) assess the frequency of disordered eating attitudes and behaviors in male figure skaters; (b) describe the psychological characteristics of male figure skaters, including body dissatisfaction, perceived weight pressures, self-esteem, perfectionism, and athletic identity; (c) examine possible contributors to disordered eating attitudes and behaviors in male figure skaters; (d) gain a preliminary understanding of the role of figure skating in shaping body image, eating, and exercise habits in male figure skaters; (e) compare disordered eating attitudes and behaviors as a function of skating discipline (i.e., singles, pairs, ice dancing, and synchronized); (f) compare disordered eating attitudes and behaviors as a function of competitive level (i.e., elite and sub-elite); and (g) compare disordered eating attitudes and behaviors as a function of sex.

Selection of psychological variables. The psychological predictor variables included in this study were body dissatisfaction, perceived weight pressures, self-esteem, perfectionism, and athletic identity. These variables were selected based on the extant literature, including research on disordered eating in athlete and non-athlete populations as well as preliminary findings on figure skaters and the figure skating subculture. A rationale for the inclusion of each predictor variable is provided next.

Body dissatisfaction. Body dissatisfaction is believed to be experienced when an individual has negative thoughts and feelings about one's body (Grogan, 2008) and typically involves a discrepancy between current and ideal body shape (Cash & Szymanski, 1995). A meta-analysis conducted by Stice (2002) revealed that body dissatisfaction is a prominent risk factor for dieting, eating pathology, and negative affect, as well as a maintenance factor for bulimic symptoms. Particularly in sports, body dissatisfaction has been shown to strongly predict bulimic symptoms (e.g., Brannan, Petrie, Greenleaf, Reel, & Carter, 2009; Greenleaf, Petrie, Reel, & Carter, 2010) as well as social physique anxiety (e.g., Krane, Stiles-ShIPLEY, Waldron, & Michalenok, 2001). Researchers have not explored body dissatisfaction as a predictor of disordered eating in figure skaters.

Perceived weight pressures. Preliminary research suggests that sub-elite figure skaters believe that weight pressures are associated with their sport (Rucinski, 1989; Taylor & STE-Marie, 2001). Perceived pressure to lose or maintain weight is predictive of disordered eating attitudes and behaviors in non-athlete populations (e.g., Halliwell & Harvey, 2006). For example, positive reinforcement for weight loss as well as criticism regarding one's weight and body shape are related to and predictive of disordered eating behavior, particularly in young females (e.g., Budd, 2007; Francis & Birch, 2005). Figure skaters may similarly receive positive

reinforcement for weight loss and criticism from important others in the skating environment, including coaches and parents (Zatalan & Zatalan, 2003). However, the predictive power of these types of sport-specific weight pressures in the development of disordered eating has not yet been systematically examined in figure skaters.

Self-esteem. Self-esteem has been shown to be highly correlated with disordered eating in non-athlete populations (e.g., Shea & Pritchard, 2007), including adolescent girls (e.g., Button, Loan, Davies, & Sonuga-Barke, 1997). Recent research suggests that self-esteem may also be associated with disordered eating in female athletes (e.g., Petrie et al., 2009). Interestingly, low self-esteem has not been shown to be a strong predictor of disordered eating in adolescent males (Furham & Calnan, 1998) and male collegiate athletes (Milligan & Pritchard, 2006). The present study therefore intended to not only examine self-esteem as a predictor of disordered eating, but to also provide insight into potential sex differences among figure skaters.

Perfectionism. Perfectionism has been defined as an enduring personality trait characterized by setting high performance standards to please the self and others and is viewed as a multidimensional construct (Hewitt & Flett, 1991). Much of the research has defined perfectionism as negative and unhealthy in both general (Flett & Hewitt, 2002) and sport-specific domains (Hall, 2006). However, other theorists contend that perfectionism can also be positive and healthy (Rice & Ashby, 2007) such that individuals strive to achieve high personal standards and positive outcomes (Terry-Short, Owens, Slade, & Dewey, 1995). Perfectionism has been linked to disordered eating in non-athlete populations (e.g., Bulik et al., 2003; Halmi et al., 2000) as well as female recreational and varsity athletes (e.g., Hopkinson & Lock, 2004).

Figure skating is anecdotally believed to attract and promote perfectionism (Grenfell & Rinehart, 2003; Ryan, 1995). A recent study revealed that a global sense of

unhealthy/maladaptive perfectionism was associated with unhealthy/negative body attitudes specifically in figure skaters (Dunn, Craft, & Causgrove Dunn, 2011). However, the measure employed (i.e., Sport-Multidimensional Perfectionism Scale) did not conceptually distinguish between positive and negative perfectionism. This study therefore sought to discriminate between positive and negative perfectionism in predicting disordered eating in figure skaters by using alternative instruments.

Athletic identity. Only two studies have examined the role of athletic identity in the development of disordered eating (Gapin & Petruzzello, 2011; Jones, Glimmeyer, & McKenzie, 2005). One preliminary case study of a former elite swimmer revealed that a strong athletic identity and a vulnerable overall sense of self played a critical role in the commitment to engage in disordered eating behaviors to succeed in her sport (Jones et al., 2005). As many figure skaters tend to specialize in their sport and perhaps prematurely foreclose on their identity as a skater (Cummins, 2007), an examination of the role of athletic identity and disordered eating was deemed worthy of exploration.

CHAPTER III

METHODOLOGY

Research Design

A paper-pencil survey methodology was used to assess the frequency and psychological predictors of disordered eating attitudes and behaviors in female sub-elite figure skaters and to collect additional data with other skaters across skating discipline, competitive level, and sex. Descriptive statistics, correlations, t-tests, one-way analysis of variance, multiple linear regression, discriminant analysis, and qualitative analysis procedures were used to address each research question and hypothesis. When appropriate, disordered eating attitudes and behaviors served as the dependent or criterion variable, while independent or predictor variables included body dissatisfaction, perceived weight pressures, self-esteem, negative perfectionism, positive perfectionism, and athletic identity.

Participants

A total of 304 figure skaters participated in this study from a population of approximately 180,000. Three skaters were removed from the analysis due to incomplete demographic information, yielding a final sample of 301 participants. To be included in this study, participants had to be current figure skaters and at least 12 years of age. Participants under the age of 12 and over 30, former figure skaters, basic skills skaters, and those competing at the adult test levels were excluded from the sample. Data were collected in 19 figure skating clubs ranging from recreational to highly competitive training programs. More specifically, these included clubs that focused on fun and fundamental skills, emphasized the development of locally and regionally competitive athletes, or invested resources in training elite skaters for national and international competition (e.g., Nationals, Olympics). Clubs were located across five states, including

Michigan, Indiana, Kentucky, Ohio, and Pennsylvania. However, in some cases, participants represented clubs in states across other regions of the United States (i.e., California, Texas, Colorado, and Alaska) and other countries (i.e., Canada, Ukraine, and France). All skaters were fluent in English. A return rate of 43% can be calculated by dividing the number of participating clubs (19) by the number of clubs contacted (44). However, because some skaters may have represented clubs outside the 19 included in the project (e.g., if he/she was a visiting skater or recruited at a competition), this return rate is an approximate estimation.

Procedures

This study received approval from the Institutional Review Board of Michigan State University prior to participant recruitment. Figure skating clubs were identified using the US Figure Skating club directory. Figure skating club presidents, program directors, and coaches were contacted via phone or email. A description of the study was provided and permission to recruit skaters was formally requested. If written permission was granted, the investigator coordinated an appropriate time to travel to each respective ice rink.

Participants were recruited in one of four ways: (a) parents and skaters were contacted in advance to set up a date and time for data collection; (b) parents and skaters were contacted before or after skating practice and recruited to participate; (c) parents and skaters approached a recruitment table at a figure skating competition; or (d) parents and skaters were invited to participate following a mental skills training seminar provided by the doctoral candidate submitting this dissertation, who will henceforth be referred to as the primary investigator.

In all cases, written informed consent/assent (See Appendix A) was obtained prior to voluntary participation in this study. The investigator then administered a survey battery (See Appendix B) to participants in a private location in the absence of parents and coaches. Prior to

administration, the investigator reviewed participant's confidentiality rights and reminded them that their participation was completely voluntary, that they may terminate their participation at any time, and that they may refuse to respond to any question. In appreciation of their volunteer participation, skaters received a sport-specific mental skills training packet and an educational resource sheet on eating behaviors and body image.

Instrumentation

The survey battery included demographic items, as well as assessments of disordered eating attitudes and behaviors, body dissatisfaction, weight pressures, self-esteem, perfectionism, and athletic identity. Several open-ended questions on the role of figure skating in shaping body image perceptions, eating, and exercise habits were also included. The order in which the measures were presented in the survey battery was designed to begin with the least sensitive topics first (i.e., athletic identity and self-esteem), followed by those most pertinent to the research questions (i.e., body dissatisfaction, disordered eating attitudes and behaviors, weight pressures, perfectionism, and open-ended items), and end with those easiest to answer (i.e., demographic items). Together, the survey battery took approximately 20 to 25 minutes to complete.

Psychometric properties of the selected instruments are described in the next section. As the primary purpose of this study was to assess female sub-elite figure skaters, all reliability estimates provided reflect those determined for this group. Although not described here, instruments were also found to be reliable for male figure skaters as a group as well as the total sample of figure skaters examined in additional analyses.

Athletic Identity. The Athletic Identity Measurement Scale (AIMS) was used to assess athletic identity among figure skaters. The AIMS consists of 10 items intended to measure the

degree to which a participant identifies him or herself as an athlete using a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree) (Brewer, Van Raalte, & Linder, 1993). Higher scores indicate stronger identification with the athlete role while lower scores indicate weaker identification (Brewer et al., 1993). Internal consistency has been reported at .93 and test-retest reliability at .89 over a two week period (Brewer et al., 1993). The AIMS is correlated with measures assessing similar constructs, including the importance of sport competence subscale of the Perceived Importance Profile ($r = .83$) (Brewer et al., 1993). In the current study, Cronbach's alpha coefficient was .83 for female sub-elite figure skaters.

Self-esteem. The Rosenberg Self Esteem Scale (RSE) was used to examine global self-esteem among figure skaters. The RSE consists of 10 items intended to serve as a unidimensional measure of global self-esteem using a 4-point response format (0 = strongly disagree, 3 = strongly agree) with higher scores indicating higher self-esteem (Blascovich & Tomaka, 1991). Although this instrument was originally designed to measure the self-esteem of high school students (Rosenberg, 1965), it has since been used across a wide range of age groups, including seventh through 12th grade students (e.g., McCarthy & Hoge, 1982), undergraduates (e.g., Crandell, 1973), and adults (e.g., Goldsmith, 1986).

The RSE demonstrates acceptable reliability and validity. Example statistics are provided here. In examining internal consistency, Cronbach alpha's has been reported at .77 (Dobson, Goudy, Keith, & Powers, 1979) and .88 (Fleming & Courtney, 1984). Test-retest correlations have been reported at .85 for 28 participants after a 2-week interval (Silber & Tippet, 1965) and .82 for 259 participants after a 1-week interval (Fleming & Courtney, 1984). The RSE demonstrates adequate convergent validity with several other self-esteem-related constructs, including confidence ($r = .65$), popularity ($r = .39$) (Lorr & Wunderlich, 1986), academic self-

concept ($r = .38$) (Reynolds, 1988), peer ratings of self-esteem ($r = .32$) (Demo, 1985), and other self-esteem measures (Savin-Williams & Jaquish, 1981). The RSE demonstrates divergent validity with constructs associated with perceptions of low self-worth, including anxiety ($r = -.64$) and depression ($r = -.54$) (Fleming & Courtney, 1984). Associations with social-desirability range from .10 (Reynolds, 1988) to .33 (Fleming & Courtney, 1984). Lastly, the RSE also demonstrates adequate discriminant validity such that it shows no significant correlations with grade point average ($r = .10$), locus of control ($r = -.04$) (Reynolds, 1988), gender ($r = .10$), age ($r = .13$), work experience ($r = .07$), marital status ($r = .17$), and birth order ($r = .02$) (Fleming & Courtney, 1984). In the current study, Cronbach's alpha coefficient was .83 for female sub-elite figure skaters.

Body dissatisfaction. The Contour Drawing Rating Scale (CDRS) was used to assess body dissatisfaction in figure skaters. The CDRS includes 9 contour drawings of females and 9 contour drawings of males that gradually increase in size (M. A. Thompson & Gray, 1995). The CDRS was designed to improve upon previous body image measures using silhouettes and contour drawings by developing more realistic representations of the human body, including the hip-to-waist ratio. Participants are generally asked to choose the image that best depicts their actual body size and then their ideal body size. A calculated discrepancy in their selections is used to measure body dissatisfaction (M. A. Thompson & Gray, 1995). Scores range from 0 to ± 8 with greater absolute values indicating higher levels of body dissatisfaction (M. A. Thompson & Gray, 1995).

Psychometric properties of this instrument are within acceptable range. In a study of 32 female college-aged students (ages 18 to 23), test-retest reliability was reported at .78 using a one week interval. Concurrent validity was also illustrated through strong correlations between

perceived body size and self-reported weight ($r = .71$) and Body Mass Index (BMI) ($r = .59$) (M. A. Thompson & Gray, 1995). In a study of 1,056 7th and 8th grade females (ages 11.8 to 14.7 yrs), Wertheim, Paxton, and Tilgner (2004) reported test-retest reliability at .84 (Time 1 – Time 2 at two weeks), .83 (Time 1 – Time 3 at six weeks), and .77 (Time 1 – Time 4 at 14 weeks). Convergent validity was demonstrated through moderate to strong correlations between current-ideal figure discrepancy scores and the body dissatisfaction subscale of the Eating Disorder Inventory (EDI) ($r = .40$), the drive for thinness scale of the EDI ($r = .62$), and the Dutch Eating Behaviour Questionnaire-Restrained Eating Scale ($r = .56$) (Wertheim et al., 2004). A strong correlation was also identified between BMI and self-reported current body size ($r = .69$). Discriminant validity was supported through low correlations with a social desirability measure ($r < -.15$) (Wertheim et al., 2004). In the current study, Pearson product-moment correlations showed that self-reported current body size using the CDRS was strongly related to both BMI ($r = .66$; $p = .001$) and self-reported weight ($r = .61$; $p = .001$) for female sub-elite figure skaters.

Instructions used for the CDRS in this study were developed based on the generic guidelines set forth by the instrument developers (M. A. Thompson & Gray, 1995) as well as the adaptations recommended for younger (adolescent and pre-adolescent) age groups (Wertheim et al., 2004). In addition to current and ideal body size, participants were asked to select the image that most accurately represents what the ideal skater should look like to determine possible discrepancies between current size, ideal size, and ideal size for a desirable athlete specifically in their sport.

Disordered eating attitudes and behaviors. The Eating Attitudes Test-26 (EAT-26) was used to assess disordered eating attitudes and behaviors in figure skaters. The EAT-26 consists of 26 items intended to examine attitudes and behaviors that resemble anorexia nervosa

with three subscales (i.e., dieting, bulimia and food preoccupation, and oral control). However, only the global score was of interest in this study.

The 26-item version is highly correlated with the total scores on the original EAT containing 40 items (Garner & Garfinkel, 1979; Garner et al., 1982). Each item is rated on a 6-point scale (1 = never; 6 = always). Scores are recoded on a 4-point scale (0 = never, rarely, sometimes; 1 = often; 2 = usually; 3 = always) with higher scores indicating greater disordered eating symptomatology (Garner et al., 1982). Although this measure does not yield a specific diagnosis for an eating disorder, it has been useful in assessing eating disorder risk across various populations, including female high school students, young adults, adults (e.g., Button & Whitehouse, 1981; King, 1989, 1991; Williams, Scafer, Shisslak, Gronwaldt, & Comerici, 1986), and athletes (e.g., Garner, Rosen, & Barry, 1998). Specifically, scores greater than or equal to 20 indicate that an individual is within clinical range of an eating disorder (Garner et al., 1982).

The EAT-26 demonstrates acceptable reliability and validity (Williamson, Anderson, Jackman, & Jackson, 1995). Internal consistency has been reported at .91 for college female students (Mazzeo, 1999) and test-retest reliability at .84 over a 2 to 3 week time period for 56 subjects (Carter & Moss, 1984). This measure demonstrates concurrent validity with other measures of disordered eating including the Bulimia Test-Revised (BULIT-R; $r = .67$) (Smith & Thelen, 1984) and adequately discriminates between eating disorder groups and non-clinical controls (e.g., Garner & Garfinkel, 1979; Williamson, Cubic, & Gleaves, 1993). In the current study, Cronbach's alpha coefficient was .86 for female sub-elite figure skaters.

Perceived weight pressures. The Weight Pressures in Sport-Females (WPS-F) and the Weight Pressures in Sport-Males (WPS-M) were used to examine perceived weight pressures

with female and male figure skaters respectively. The WPS-F consists of 16 items intended to measure sport-specific weight pressures among female athletes using a 6-point scale (1 = never; 6 = always) (Reel, SooHoo, Petrie, Greenleaf, & Carter, 2010). In addition to a total average weight pressure score, this instrument yields scores for four subscales including weight pressures from coach/teammates/sport, self-consciousness of weight and appearance, importance of weight and appearance, and weight limit (Reel et al., 2010). However, only the total average weight pressure score was of interest in this study. Higher scores represent greater perceived weight pressures in sport (Reel et al., 2010). A preliminary assessment of the WPS-F with 204 Division I female athletes across 17 sports (i.e., alpine skiing, basketball, cheerleading, cross country, diving, golf, gymnastics, ice hockey, lacrosse, rowing, soccer, softball, swimming, tennis, track, volleyball) revealed high internal consistency ($\alpha = .90$) (Reel et al., 2010). In the current study, Cronbach's alpha coefficient was .90 for female sub-elite figure skaters.

Minor wording of the items was altered to adapt the measure to the population of interest based on previous studies using a similar instrument with figure skaters known as the SKATE and SYNCHROSKATE (Greenleaf, 2004; Taylor & STE-Marie, 1999). Specifically, "team/sport" was changed to "skating," "teammates" to "skating peers," "team members" to "skaters," and "team uniform" to "skating attire." Item one (i.e., my sport has a weight requirement to try out) was also altered to more readily apply to skaters of most skating disciplines (i.e., skaters must be a certain body weight to succeed in the sport).

The WPS-M consists of 14 items intended to measure sport-specific weight pressures among male athletes using a 6-point scale (1 = never; 6 = always) (Galli et al., 2011). In addition to a total average weight pressure score, this instrument yields scores for two subscales, including coach/teammate pressures and appearance pressures (Galli et al., 2011). However, only

the total average weight pressure score was of interest in this study. Higher scores indicate greater perceived weight pressures in sport (Galli et al., 2011). A preliminary investigation with 203 Division I male athletes across 16 sports (i.e., football, baseball, track and field, swimming, basketball, lacrosse, cheerleading, cross-country, golf, ice hockey, diving, fencing, alpine skiing, wrestling, volleyball, and soccer) revealed high internal consistency ($\alpha = .90$) (Galli et al., 2011). In the current study, Cronbach's alpha coefficient was .75 for male figure skaters.

Similar to the WPS-F, minor wording of the items for the WPS-M was altered to adapt the measure to the population of interest. Specifically, "team/sport" was changed to "skating," "teammates" to "skating peers," "team members" to "skaters," and "team uniform" to "skating attire." Item two (i.e., the leanest athletes get chosen for the best positions on the team of the best positions in a game/competition) and item 12 (i.e., weigh-ins are held periodically throughout the season) were altered to more readily apply to skaters (i.e., the leanest athletes get special treatment; weigh-ins are held periodically for skating).

Perfectionism. The Positive and Negative Perfectionism Scale (PANPS) was used to assess levels of perfectionism in figure skaters. The original PANPS consists of 40-items intended to measure normal and neurotic types of perfectionism using a Likert-type scale (1 = strongly agree; 5 = strongly disagree) (Terry-Short et al., 1995). This instrument consists of four scale scores including positive perfectionism (i.e., normal perfectionism in which one seeks to achieve positive consequences), negative perfectionism (i.e., neurotic perfectionism in which one seeks to avoid negative consequences), self-oriented perfectionism (i.e., drive to set goals for oneself and stringently self-evaluate), and social-oriented perfectionism (i.e., perception that unrealistic expectations are being set by others, placing external pressure on the individual) with 20 items in each. Subscale scores range from 20 to 100 with higher scores representing greater

levels of perfectionism. Only positive and negative perfectionism scores were of interest in this study.

Terry et al. (1995) demonstrated the construct validity of this instrument such that PANPS scores identified 86% of a sample of individuals with clinically diagnosed eating disorders. In a sample of 540 Australian and New Zealand elite athletes, internal consistency was reported at .83 for positive perfectionism and .81 for negative perfectionism (Haase & Prapavessis, 2004). In the current study, Cronbach's alpha coefficients were .81 and .91, respectively for female sub-elite figure skaters.

Open-ended items. Several open-ended items were used to gain a preliminary understanding of the role of figure skating in shaping body image, eating, and exercise habits (e.g., In general, have your experiences in skating positively influenced the way you view your body? If yes, in what ways?) These items were created specifically for this study and can be found in Appendix B. Each question began with a closed-response format (i.e., yes, no) and was followed by an open-ended prompt (e.g., if yes, in what ways?).

Demographic variables. Demographic questions gathered information about the skaters' characteristics and background (e.g., sex, age, height, weight, menstrual history when appropriate), their skating experience (e.g., years in skating, skating discipline, competitive level), training regimen (e.g., hours per week spent training for skating), and reasons for participation (e.g., primary reasons for involvement).¹

CHAPTER IV

RESULTS

Demographic Information

A total of 301 figure skaters (272 females, 29 males) ages 12 to 26 ($M = 15.90$, $SD = \pm 3.24$) were included in this study. The average height for the total sample was 63.38 inches ($SD = \pm 3.55$) while average weight was 120.72 pounds ($SD = \pm 27.19$). Body mass index (BMI), calculated based on self-reported height and weight (i.e., $703[\text{weight in pounds}/\text{height in inches}^2]$), was 20.96 ($SD = \pm 3.55$). The majority of participants identified themselves as Caucasian (260/301 [86.4%]), followed by Other (e.g., bi-racial; 19/301 [6.3%]), Asian American/Pacific Islander (17/301 [5.6%]), African American/Black (4/301 [1.3%]), and American Indian (1/301 [0.3%]). Participants reported 9.66 ($SD = \pm 4.32$) years of figure skating experience with an average age of first competition of 8.02 years ($SD = \pm 2.65$). The majority of participants reported that their primary skating focus was singles (177/301 [58.8%]), followed by multiple (i.e., endorsed more than one skating focus; 51/301 [16.9%]), synchronized (50/301 [16.6%]), ice dancing (21/301 [7%]), and pairs (2/301 [0.7%]). Finally 64.3% (191/297) of participants were categorized as sub-elite figure skaters and 35.7% (106/297) were classified as elite figure skaters based on the aforementioned classification criteria for competitive level (See the Operational Definitions section of Chapter 1 of this dissertation).

As the primary purpose of this study was to examine female sub-elite figure skaters and to conduct additional analyses with male figure skaters, specific demographic and skating background information is provided for these groups in Table 1 for females and Table 2 for males. In addition, frequency tables for skating discipline are displayed for females and males in Tables 3 and 4, respectively.

Table 1

Demographic and Skating Background for Female Sub-Elite (n = 185), Female Elite (n = 83), and Total Female Figure Skaters (n = 272)

	Sub-Elite		Elite		Total	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	15.21	± 2.82	16.63	±3.25	15.63	±3.02
Height (in.)	62.71	±3.01	63.26	±3.38	62.91	±3.13
Weight (lbs.)	115.55	±23.06	120.93	±26.17	117.74	±24.47
BMI	20.53	±3.32	21.16	±3.67	20.79	±3.47
Years Skating Experience	8.68	±3.96	11.34	±4.06	9.48	±4.15
Age of First Competition	8.27	±2.77	7.37	±2.38	7.99	±2.67

Table 2

Demographic and Skating Background for Male Sub-Elite (n = 23), Male Elite (n = 6), and Total Male Figure Skaters (n = 29)

	Sub-Elite		Elite		Total	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age	14.33	±3.83	19.52	±3.58	18.45	±4.15
Height (in.)	65.50	±6.60	68.30	±3.48	67.72	±4.32
Weight (lbs.)	149.58	±65.58	140.04	±24.33	148.36	±35.12
BMI	23.99	±7.74	22.15	±2.33	22.53	±3.94
Years Skating Experience	7.75	±5.38	12.17	±5.22	11.26	±5.47
Age of First Competition	8.50	±3.27	8.15	±2.31	8.22	±2.48

Table 3

Skating Disciplines for Female Sub-Elite (n =185), Female Elite (n =83), and Total Female Figure Skaters (n =272)

	Sub-Elite		Elite		Total	
	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>
Singles	136	73.5%	25	30.1%	162	59.6%
Pairs	0	0%	0	0%	0	0%
Ice Dancing	4	2.2%	8	9.6%	12	4.4%
Synchronized	18	9.7%	29	34.9%	49	18%
Multiple	27	14.6%	21	25.3%	49	18%

Table 4

Skating Disciplines for Male Sub-Elite (n = 6), Male Elite (n = 23), and Total Male Figure Skaters (n = 29)

	Sub-Elite		Elite		Total	
	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>
Singles	3	50%	12	52.2%	15	51.7%
Pairs	0	0%	2	8.7%	2	6.9%
Ice Dancing	2	33.3%	7	30.4%	9	31%
Synchronized	1	16.7%	0	0%	1	3.4%
Multiple	0	0%	2	8.7%	2	6.9%

Evaluation of Primary Research Questions

An evaluation of the primary research questions and hypotheses is provided in the next section. When appropriate, preliminary analyses were conducted to ensure no violation of assumptions prior to conducting specific statistical tests (e.g., normality, homoscedasticity, linearity, multicollinearity). Statistical significance was set at $p \leq .05$.

Primary research question 1. *What is the frequency of disordered eating attitudes and behaviors in female sub-elite figure skaters?*

Scores at or above 20 on the Eating Attitudes Test-26 (EAT-26) suggest a high level of concern about dieting, body image, or unhealthy eating behaviors and may be indicative of a clinical eating disorder (Garner & Garfinkel, 1979; Garner et al., 1982). In the present study, an examination of scores greater than or equal to 20 on the EAT-26 revealed that 13.1% (23/176) of female sub-elite figure skaters ages 12 to 25 fell within clinical limits with scores ranging from 20 to 48. However, the mean score on the EAT-26 was 8.89 ($SD = \pm 9.05$) showing that on average female sub-elite figure skaters scored well below the 20-point clinical cut-off score and were not symptomatic of an eating disorder. As a frame of reference, only 12% (34/283) of the entire sample and 13.2% (10/76) of female elite figure skaters scored within clinical range.

Mean EAT-26 scores among female sub-elite figure skaters were compared to existing normative data with adolescent girls ages 13 to 18 (Whitaker et al., 1989), college-aged women (mean age 20.3, $SD = \pm 2.7$) (Garner et al., 1982), and a clinically anorexic group of young adult females (mean age 21.5 \pm 5.4) (Garner et al., 1982). To make meaningful comparisons with the normative data, female sub-elite figure skaters were categorized into three possible age groups, including an adolescent age group (ages 12 to 18; $M = 14.49$, $SD = \pm 1.92$), a college-aged group (ages 18 to 25; $M = 19.68$, $SD = \pm 2.14$), and the entire sample (ages 12 to 25; $M = 15.21$, $SD = \pm 2.82$).

A one-sample *t*-test revealed no significant difference in mean scores on the EAT-26 between adolescent girls ages 13 to 18 ($M = 9.7$) and female sub-elite figure skaters ages 12 to 18 ($M = 8.8$; $t(156) = -1.30$, $p = .196$). There was also no significant difference in mean scores on the EAT-26 between college-aged females ($M = 9.9$) and female sub-elite figure skaters ages 18 to 25 ($M = 10.36$; $t(35) = .302$, $p = .764$). However, the mean score on the EAT-26 was significantly higher for clinically anorexic young adult females ($M = 36.1$) than female sub-elite figure skaters ages 12 to 25 ($M = 8.9$; $t(175) = -39.89$, $p = .001$) where the effect size was large ($d = -2.08$). Female sub-elite figure skaters therefore showed no more signs of disordered eating than their adolescent and college-aged counterparts and significantly less than those clinically diagnosed with anorexia nervosa.

The frequency of female sub-elite figure skaters reporting “often,” “usually,” or “always” was determined for each item contained in the EAT-26 as shown in Table 5. The most frequently endorsed item was being aware of the calorie content of foods (54.3%), followed by displaying self-control around food (54.1%), enjoyment in trying new rich foods (45.9%), thinking about burning up calories during exercise (40%), and being terrified about being overweight (37.8%).

Table 5

Frequency of “Often,” “Usually,” and “Always” Responses to EAT-26 Items Among Female Sub-Elite Figure Skaters

Item	Frequency	Percentage
I am aware of the calorie content of foods that I eat.	100/184	54.3%
I display self-control around food.	100/185	54.1%
I enjoy trying new rich foods.	85/185	45.9%
I think about burning up calories when I exercise.	74/185	40%
I am terrified about being overweight.	70/185	37.8%
I am preoccupied with a desire to be thinner.	44/185	23.8%
I am preoccupied with the thought of having fat on my body.	42/185	22.7%
I feel uncomfortable after eating sweets.	41/185	22.2%
I engage in dieting behavior.	36/185	19.5%
I take longer than others to eat my meals.	35/184	19%
I cut my food into small pieces.	30/185	16.2%
I eat diet foods.	29/185	15.7%
Other people think that I am too thin.	28/185	15.1%
I find myself preoccupied with food.	24/184	13%
I give too much time and thought to food.	24/185	13%
I particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	23/184	12.5%
I avoid foods with sugar in them.	21/184	11.4%
I feel that others would prefer if I ate more.	19/185	10.3%
I feel extremely guilty after eating.	18/185	9.7%
I like my stomach to be empty.	17/185	9.2%
I have gone on eating binges where I feel that I may not be able to stop.	15/184	8.2%
I feel that food controls my life.	11/184	6%
I feel that others pressure me to eat.	11/183	6%
I avoid eating when I am hungry.	8/185	4.3%
I have the impulse to vomit after meals.	4/184	2.2%
I vomit after I have eaten.	1/184	0.5%

Primary research question 2. What are the psychological characteristics of female sub-elite figure skaters?

A one-way within-subjects ANOVA was conducted to compare scores for perceived current body shape, ideal body shape, and ideal skater body shape. Results showed a significant effect for body shape scores, Wilks' Lambda = .69, $F(2, 182) = 41.93$, $p = .01$. The effect size was large with a partial eta squared of .32. Three paired samples t-tests were used to make post hoc comparisons. Results showed that perceived current body shape ($M = 4.45$, $SD = \pm 1.50$) was significantly greater than both ideal body shape ($M = 3.69$, $SD = \pm 1.50$) and ideal skater body shape ($M = 3.58$, $SD = \pm 1.18$). As illustrated pictorially in Figure 2, this finding suggests that on average female sub-elite figure skaters perceived their bodies to be larger than desirable. However, the discrepancy between mean ideal body shape and mean body shape for the ideal skater was quite small and statistically non-significant.

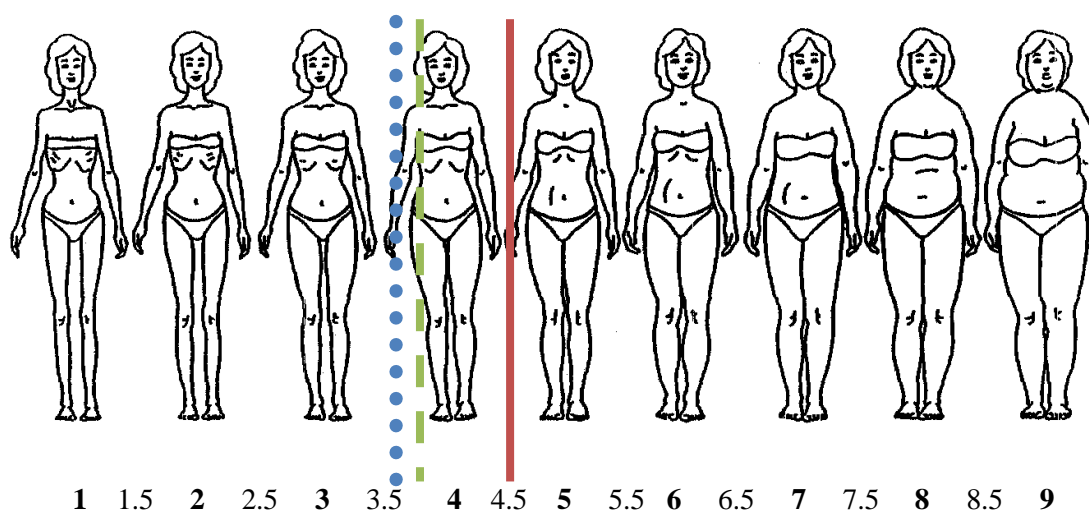


Figure 2. Perceived current, ideal, and ideal skater's body shape for female sub-elite figure skaters ($n = 184$). Red solid line = perceived current body shape, Green dashed line = perceived ideal body shape, Blue dotted line = perceived ideal skater's body shape. For interpretation of the references to color in this and all other figures, the reader is referred to the electronic version of this dissertation.

Means and standard deviations were determined for global scores assessing athletic identity, self-esteem, perceived weight pressures, positive perfectionism, and negative perfectionism. To assist in interpreting the data, the range of possible scores on each of the measures was divided into four proportions. Means are described in the context of the proportion of possible scores in which they fell. Specifically, means approximately within the 0% to 25% range of possible scores were considered low, 25% to 50% were considered low to moderate, 50% to 75% were considered moderate to high, and 75% to 100% were considered high.²

As shown in Table 6, mean athletic identity fell within the 50% to 75% range of possible scores (40 to 55) suggesting that on average female sub-elite figure skaters identified moderately to strongly with their sport. Similarly, mean self-esteem also fell within the 50% to 75% range of possible scores (15 to 22.5) indicating that on average female sub-elite figure skaters had moderate to strong self-esteem. Mean perceived weight pressures, falling within the 25% to 50% range of possible scores (2.25 to 3.50), shows that on average female sub-elite figure skaters perceived a low to moderate level of weight pressures in their environment. Finally, mean positive perfectionism fell within the 75% to 100% range of possible scores (80 to 100), while mean negative perfectionism fell within the 25% to 50% range (40 to 60). This finding indicates that on average female sub-elite figure skaters possessed strong levels of positive perfectionism and low to moderate levels of negative perfectionism.

Table 6

Descriptive Statistics for Psychological Characteristics Among Female Sub-Elite Figure Skaters

Psychological Characteristic	<i>n</i>	<i>M</i>	<i>SD</i>	Range of Possible Scores
Athletic Identity	181	47.13	±10.63	10 to 70
Self-esteem	182	22.40	±4.60	0 to 30
Perceived Weight Pressures	175	2.35	±0.87	1 to 6
Positive Perfectionism	172	81.02	±7.94	20 to 100
Negative Perfectionism	178	58.31	±13.78	20 to 100

Primary research question 3. *What are the contributors of disordered eating attitudes and behaviors in female sub-elite figure skaters?*

For the following statistical analyses, square root transformed disordered eating scores and square root transformed body dissatisfaction scores were used to meet statistical assumptions for a normal distribution.

H1: Disordered eating attitudes and behaviors in female sub-elite figure skaters will show a significant positive relationship with years in skating.

Hypothesis 1 was not supported. Results from a Pearson product-moment correlation coefficient analysis revealed no significant relationship between disordered eating scores and years in skating ($r = .103$, $n = 175$, $p = .174$).

H2: Disordered eating attitudes and behaviors in female sub-elite figure skaters will differ by competitive experience (i.e., never competed, local competition, open event/non-qualifying regionals, qualifying regionals, sectionals, collegiate competition).

Participants were divided into six groups (Group 1: Never competed [$n = 2$], Group 2: Local competition [$n = 36$], Group 3: Open event/non-qualifying regionals [$n = 37$], Group 4: Qualifying regionals [$n = 53$], Group 5: Sectionals [$n = 7$], Group 6: Collegiate competition [$n = 5$]). Groups 1, 5, and 6 were dropped from the analysis due to insufficient sample size.

Synchronized skaters were also removed from the analysis as they are a unique group with a competitive structure different than singles, pairs, and ice dancing. Finally, those who endorsed more than one skating discipline were removed to preserve independent groups.

With the remaining groups in the analysis, Hypothesis 2 was supported. Specifically, a one-way between-groups analysis of variance revealed significant differences in disordered eating scores for three competitive experience groups: $F(2, 115) = 4.30$, $p = .016$. The actual

difference in mean scores between groups was moderate. The effect size, calculated using eta squared, was .06. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 2 (i.e., locally competitive skaters; $M = 1.92$, $SD = \pm 1.24$) was significantly lower than Group 3 (i.e., open event/non-qualifying regional level skaters; $M = 2.76$, $SD = \pm 1.45$, $p = .044$) and Group 4 (i.e., qualifying regional level skaters; $M = 2.80$, $SD = \pm 1.53$, $p = .020$). These results indicate that disordered eating moderately increased with higher levels of competitive figure skating experience.

H3: Disordered eating attitudes and behaviors in female sub-elite figure skaters will be significantly predicted by a combination of psychological variables (i.e., body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity).

Preliminary analyses showed that statistical assumptions of a standard multiple regression (i.e., normality, linearity, homoscedasticity) were met. Predictor variables were also assessed for multicollinearity and were decidedly not intercorrelated as shown in Table 7 (e.g., $r < .60$, $VIF < 4$, $Tolerance > .20$). A standard multiple regression was then used to assess the ability of six psychological variables to predict disordered eating attitudes and behaviors. Hypothesis 5 was partially supported. Using the enter method, a significant model emerged: $F(6, 162) = 21.31$, $p = .001$. The total model accounted for 45% of the variance in disordered eating. Significant variables included body dissatisfaction (Beta = .35, $p = .001$), perceived weight pressures (Beta = .24, $p = .004$), positive perfectionism (Beta = .19, $p = .008$), and negative perfectionism (Beta = .18, $p = .026$). Self-esteem (Beta = -.05, $p = .506$) and athletic identity (Beta = -.05, $p = .514$) were not significant predictors in this model.

Table 7

Intercorrelations Among Predictor Variables for Female Sub-Elite Figure Skaters

Variable	1	2	3	4	5	6
1. Body Dissatisfaction	-					
2. Self-esteem	-.32	-				
3. Perceived Weight Pressures	.42	-.47	-			
4. Negative Perfectionism	.27	-.49	.56	-		
5. Positive Perfectionism	.04	.12	.22	.27	-	
6. Athletic Identity	-.05	-.20	.35	.32	.39	-

Primary research question 4: *What is the perceived role of figure skating in shaping body image, eating, and exercise habits in female sub-elite figure skaters?*

To understand the perceived role of figure skating in shaping body image, eating, and exercise habits, participants were asked to respond to a series of five items that can be found in Appendix B. Each item began with a close-ended question (e.g., in general, have your experiences in skating positively influenced the way you view your body?). Participants were then given the option to provide an open-ended response if applicable (e.g., if yes, in what ways?).

Close-ended responses from each participant in the entire sample were organized by sex (i.e., male, female) and competitive level (i.e., elite, sub-elite). Data for female sub-elite figure skaters are provided in Table 8. An inspection of this table reveals paradoxical responses. Over 90% of the respondents indicated that their figure skating experiences positively influenced the way they eat and/or exercise, and approximately 83% felt that figure skating positively influenced the way they viewed their body. However, the majority also believed that the sport is linked to pressures to lose or maintain weight, and a notable proportion perceived a negative influence of figure skating on body image, eating, and exercise. These results suggest that figure

skating has the potential to both positively and negatively influence body image, eating, and exercise behaviors among female sub-elite figure skaters.

Table 8

Close-ended Response Summary for Female Sub-Elite Figure Skaters: Role of Figure Skating in Shaping Body Image, Eating, and Exercise

Close-Ended Question	Yes		No	
	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>
Some believe that the sport of figure skating is linked to pressures to lose or maintain weight. Do you agree with this belief? (<i>n</i> = 181)	106	58.6%	75	41.4%
In general, have your experiences in skating positively influenced the way you view your body? (<i>n</i> = 185)	153	82.7%	32	17.3%
In general, have your experiences in skating negatively influenced the way you view your body? (<i>n</i> = 182)	70	38.5%	112	61.5%
In general, have your experiences in skating positively influenced the way you eat and/or exercise? (<i>n</i> = 184)	169	91.8%	15	8.2%
In general, have your experiences in skating negatively influenced the way you eat and/or exercise? (<i>n</i> = 182)	35	19.2%	147	80.8%

Due to the large volume of open-ended responses provided, qualitative analysis procedures were utilized. Specifically, open-ended responses from each participant in the entire sample were transcribed verbatim from the surveys and entered into Excel spreadsheets. To reduce bias in the data analysis process, the data were de-identified such that any demographic information, including sex, age, competitive level, and skating focus (i.e., singles, pairs, ice dancing, synchronized), was removed.

In traditional qualitative analysis procedures, participant responses are first coded into meaningful segments of text to assist in organizing and interpreting detailed and often lengthy

qualitative interviews (Côté, Salmela, Baria, & Russell, 1993). However, given that in depth qualitative interviews were not conducted in this study, all original text was kept intact to preserve the little context available for each response. Typical trustworthiness procedures were also not possible in this study. For example, because the data collected was completely anonymous, the researchers could not send transcripts or data summaries back to participants for their corrective feedback or conduct follow-up interviews for clarification (Lincoln & Guba, 1985). Therefore, purposeful selection of a secondary investigator to assist with the qualitative analysis was critical.

Specifically, the secondary investigator had considerable experience in qualitative analysis, but unlike the primary investigator, had never participated in an aesthetic sport, never encountered disordered eating in her personal experiences, and was far removed from the figure skating community. It was believed that including an investigator with less familiarity and emotional investment in both the sport and the topics addressed would enhance the rigor of the analysis process. While the primary investigator used her figure skating experiences to provide context and understanding of the participants' responses, the selected secondary investigator assisted in identifying blind spots, omissions, judgments, and preferences of the primary investigator (Rajendran, 2001). Both members of this research team independently organized the data for each open-ended prompt into dimensions, themes, and sub-themes. To promote a comprehensive understanding of the responses and to further reduce bias, consensual validation procedures were employed (Lincoln & Guba, 1985). More specifically, the investigators met tri-weekly to discuss any disagreements in data organization and interpretation until consensus was reached. Following analysis, dimensions, themes, and sub-themes were independently reviewed by each investigator to ensure accuracy.

Analyzed responses were then coded according to major demographic categories, including sub-elite female, elite female, sub-elite male, and elite male figure skaters. Frequencies of responses within each demographic category were counted by theme. Ratios and percentages were then calculated to describe the qualitative data in a numerical format. As the primary interest of this study concerned the data on female sub-elite figure skaters, dimensions, themes, sub-themes, frequencies, and percentages for this group are provided in Tables 9 through 14. In the following section, these results are described in depth with an illustration of key quotes. When quotes are provided, “P” represents “Participant,” followed by the respective participant number assigned as well as pertinent demographic information, including age and skating focus (i.e., singles, pairs, ice dancing, synchronized).

Why pressures exist to lose or maintain weight in figure skating. Participants were asked to indicate whether they agreed with the belief that figure skating is linked to pressures to lose or maintain weight. Those who reported “yes” (106/181 [58.6%]) were prompted to explain why they thought these pressures existed. A total of 106 female sub-elite figure skaters who indicated “yes” provided an open-ended response to this prompt. Eight dimensions and 12 themes emerged from the data (See Table 9).

Performance demands was the most frequently cited dimension (61.3%). In particular, aspects of technical performance, including jumping, spinning, and being lifted into the air, were an especially important reason for pressure to lose or maintain weight (27.4%). For example, one skater suggested that the difficult skills required in skating could be more easily executed with a lighter body:

The thing about figure skating is that it's all about being able to throw yourself or other people into the air. The less weight you have on your body, the easier it is. Therefore I

believe there is self pressure to maintain a healthy lean weight (P247, Age 16, Singles/Ice Dancing).

Another skater noted that successful skating can often be reduced to the biomechanical requirements of the sport: “The higher the ratio of muscle to weight, the easier it is to rotate. Technique and hard work can overcome this to some extent, but physics will always play a role too” (P102, Age 22, Singles/Ice Dancing/Synchronized).

In addition to technical aspects, 18.9% reported that pressures exist to lose or maintain weight because of the aesthetic component of performance and the nature of being judged. For example, one skater noted that thinness is equated with aesthetic appeal in skating: “...some ideal body is another form of perfection, and people always want to be better or be the thinnest or prettiest because in skating being thin is pretty” (P144, Age 14, Singles). Another reported that physical appearance is indeed a priority in the figure skating world:

Skating is a sport based on performance and appearance. A lot of time is spent working on picking the perfect dress/costume and choosing the movement that looks the best, so physical appearance should be at its highest. This includes having a small body that's lean because it generally looks better with the performance on the ice to be petite with good lines (P54, Age 17, Singles).

A third skater noted that appearance is a concern for all skaters and especially for those involved in pairs:

It exists because a lot of this sport has to do with body image. If you aren't a certain body type, people/judges/coaches/skaters will give up on you, judge you, etc., especially for pairs. If you aren't a certain weight/look, you'll never get a partner (P238, Age 15, Singles).

Also within the performance demands dimension, skaters reported that being thinner and smaller is stereotypically perceived to be associated with better skating performance (14.2%). For example, one skater noted that the pressure to lose or maintain weight comes from the popular belief that overweight skaters cannot achieve performance success: “I think these pressures exist because people/skaters don't think that someone overweight can be successful in the sport and that you must have an average weight or less” (P240, Age 13, Singles). Another mentioned that good skating is linked to a thin body type and a specified body composition: “I feel that to be a good skater, you should be skinny and have no body fat” (P138, Age 19, Singles).

The second most frequently cited dimension involved living up to ideals both within and outside of skating (17.9%). Specifically, 13.2% of skaters reported that pressures to lose or maintain weight exist because of expectations to achieve a sport-specific body type. For example, one skater noted that a figure skating body should be thin: “I think this because there are set body images for all types of sports. With skating, I believe it is that they should be skinny or lean” (P268, Age 15, Singles). Others indicated that there are pressures to meet societal views and expectations of the appropriate body (4.7%). For example, one skater reported that society places pressure on girls that extend beyond the skating environment: “I think these exist because society is very pressuring for girls on weight, not just in skating” (P210, Age 13, Singles). Another stated that such pressures are typical of most female-dominated sports: “Just like any other predominantly female sport or activity, most people notice body image before anything else” (P258, Age 19, Singles).

The third most frequently cited dimension was exposure to the bodies of the best skaters (16%). For example, one skater described how the bodies of skaters in the media can impact a

younger generation: “Skaters on TV are never fat. Seeing very successful skaters be thin draws a connection for newer skaters to compare themselves to” (P264, Age 15, Singles).

The fourth most frequently cited dimension concerned meeting the demands of important others (14.2%). For example, 6.6% reported that pressures to lose or maintain weight in skating exist because of social comparison with their peers. One skater noted: “I think it's because girls in sports like this always think that they're too big or too fat whenever they see skaters that are skinnier and feel the need to lose more weight than necessary” (P91, Age 13, Singles). Other skaters mentioned that pressures to lose or maintain weight exist in skating because of coaches (5.7%). For example, one skater reported that although she has not personally experienced this type of pressure from a coach, she has witnessed the experience in others: “It depends on the coach. I have never had anything said to me but every other girl except one in the group I train with has been told to lose weight, which is sad because they don't need to...” (P16, Age 18, Singles/Pairs).

The fifth most frequently cited dimension was skating dresses and attire (11.3%). For example, one skater suggested that flaws are difficult to conceal when in tight skating clothes: “The clothing is tight, so body imperfections are apparent” (P140, 10, Singles). Another mentioned that some are criticized while dressed in skating clothes: “People always say mean things about chubby people when they are in skating clothes, even if they're fat themselves” (P47, Age 12, Singles). Other reported reasons why pressures exist to lose or maintain weight in figure skating are provided in Table 9.

Table 9

Open-Ended Response Summary for Female Sub-Elite Figure Skaters: Why Pressures Exist to Lose or Maintain Weight in Figure Skating

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 106)	Percentage
Performance Demands	65	61.3%
Technical Elements (e.g., jumps)	29	27.4%
Aesthetics/Judging Component	20	18.9%
Being Thin/Small Means Better Skating	15	14.2%
Skate Well In General	14	13.2%
Being Fit/In Shape	9	8.5%
Being Thin But Muscular	9	8.5%
Ideals	19	17.9%
Standard Body for Skating/Sport	14	13.2%
Societal Views & Expectations	5	4.7%
Bodies of the Best Skaters	17	16%
Important Others	15	14.2%
Peers/Social Comparison	7	6.6%
Coaches	6	5.7%
Judges	3	2.8%
Parents	2	1.9%
Skating Dresses/Attire	12	11.3%
Pressure to Succeed/Be Perfect	7	6.6%
Personal Characteristics	5	4.7%
Media	2	1.9%
Miscellaneous	6	5.7%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Sources of pressure to lose or maintain weight in figure skating. Participants were asked to indicate whether they agreed with the belief that figure skating is linked to pressures to lose or maintain weight. In addition to explaining why they thought these pressures existed, those who reported “yes” (106/181 [58.6%]) were also prompted to explain where and/or who these pressures came from. A total of 104 female sub-elite figure skaters who indicated “yes” provided

an open-ended response to this prompt. Five dimensions, 12 themes, and eight sub-themes emerged from the data (See Table 10).

The most frequently cited dimension was pressure from others (71.2%). In particular, coaches were cited as an especially important source of pressure to lose or maintain weight (43.3%). For example, one skater reported that coaches equate thinness with success in skating: “Coaches want their students to do what they have to do with the most endurance and beauty, which thinness is connected to” (P264, Age 15, Singles). Skaters also indicated that pressures come from other skaters (36.5%). Interestingly, in addition to other skaters in general (24%) and competitors (5.8%), 13.5% noted that the *image* of those who have been successful in the sport is an important source of pressure. One skater stated: “Well if you see all those really good skaters, you notice that none of them are overweight and are average weight and, if anything at all, they'd be skinny” (P240, Age 13, Singles/Ice Dancing). Another reported noticing that skaters who win tend to have smaller bodies: “Have you ever seen a heavier-set skater win anything special/important? It's because there has probably never been one” (P238, Age 15, Singles). Other skaters noted that pressure comes from parents. One skater indicated: “Parents can be worried that their children can't be successful without the thinness aspect” (P264, Age 15, Singles).

The second most frequently cited dimension was pressure from the self (26.9%). More specifically, these skaters perceived that pressures to lose or maintain weight in skating are internal. One skater noted that although being very thin is unattractive, she believes it is necessary to succeed: “I think that they come from inside you, you see many others who are super thin and it look gross, but you know that it helps you in the long run” (P247, Age 16, Singles/Ice Dancing). Another mentioned that internal pressures come from wanting to surpass

the accomplishments of peers: “The pressure comes from the skaters themselves. You look at a person skinnier than you, and feel that they are better than you because of that, which leads to self-pressure to be thinner or not gain weight” (P52, 15, Singles).

The third most frequently cited dimension was culture and environment (23.1%). Within this dimension, some skaters reported that popular culture (16.3%) and more specifically the media (10.6%) was a source of pressure. For example, one skater suggested that the media may undermine coaches’ emphasis on health: “I also think coaches talk about being healthy, but the media makes healthy look super thin and it isn't” (P151, Age 23, Singles). Also within the culture and environment dimension, skaters reported that pressure comes from a culture specific to figure skating (11.5%) and more specifically the history or nature of the sport (10.6%). For example, one skater mentioned that figure skating holds specific expectations for an acceptable body type: “I think the pressure comes from standards for figure skating like being extremely fit and lean” (P141, Age 13, Singles). Another noted that pressures come from the performance aspect of the sport: “As much as I don't like it, I believe it comes from the same place as in the theatre. Skaters are performers. Period” (P98, Age 24, Singles).

The fourth most frequently cited dimension was watching others or social comparison (10.6%). For example, one skater mentioned feeling self-conscious when training with other skaters: “When we are working out and they are all in sports bras, I feel uncomfortable because of my abdominal area” (P137, Age 15, Singles). Other perceived sources of pressure to lose or maintain weight in figure skating are provided in Table 10.

Table 10

Open-Ended Response Summary for Female Sub-Elite Figure Skaters: Sources of Pressure to Lose or Maintain Weight in Figure Skating

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 104)	Percentage
Others	74	71.2%
Coaches	45	43.3%
Other Skaters	38	36.5%
In General	25	24%
Image of Successful Skaters	14	13.5%
Competitors	6	5.8%
Family/Parents	28	26.9%
Peers	12	11.5%
Friends	9	8.7%
Judges	6	5.8%
Fans/Audience/Spectators	5	4.8%
Everyone/Anyone	4	3.8%
Non-Skaters	3	2.9%
Governing Body/Representatives	2	1.9%
Self	28	26.9%
Culture/Environment	24	23.1%
Popular Culture	17	16.3%
Media	11	10.6%
Societal Views & Expectations	7	6.7%
Stereotypes	3	2.9%
Skating Culture	12	11.5%
History/Nature of Figure Skating	11	10.6%
Skating Dresses/Attire	2	1.9%
Watching Others/Social Comparison	11	10.6%
Pressure to Succeed/Be Perfect	6	5.8%
Miscellaneous	8	7.7%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Positive influences of figure skating on body image. Participants were asked to indicate whether their experiences in skating have positively influenced the way they view their body.

Those who reported “yes” (153/185 [82.7%]) were prompted to explain how. A total of 152 female sub-elite figure skaters who indicated “yes” provided an open-ended response to this prompt. Ten dimensions, five themes, and three sub-themes emerged from the data (See Table 11).

The most frequently cited dimension included feeling positive (35.5%). In particular, skaters reported feeling good (23.7%), confident (9.2%), and proud (3.9%) of themselves and their bodies. For example, one skater noted: “I think that my body is the way it is because of my training, and I am not embarrassed by it” (P254, Age 18, Singles). Some skaters specifically reported feeling good about their bodies because of the way they look (9.9%). For example, one skater indicated that she enjoys showing off her body while skating: “When I do moves that show off my body’s flexibility or strength I always feel happy and confident. I like my body and its build and showing it off in my program makes me feel good” (P279, Age 14, Singles). Others reported that they feel good because of the way they look in their skating attire in particular (2.6%). For example, two skaters noted that they enjoy fitting into smaller skating clothes: “When I am able to fit into small dress sizes I feel good” (P107, Age 15, Singles); “The sport has made my body so muscular, and I like how I look when I go out and skate in my fun little Nike spandex shorts and tank tops” (P259, Age 16, Singles).

The second most frequently cited dimension was achieving or maintaining a desirable body (34.9%). Specifically, some skaters reported that skating has enabled them to become lean, tone, or muscular (27.6%). One skater stated: “I feel that if I did not skate, I would not work out as hard as I do to gain more muscle, so I would not have the fit body that I have” (P250, Age 14, Singles). Others indicated that skating has enabled them to become thin or to lose weight (10.5%). One skater reported: “I am thin and skating has helped me become thin” (P53, Age 13,

Singles). Another mentioned that skating has allowed her to achieve a healthy weight by training hard and eating well: “I was overweight before I started skating, and training and eating well have brought me in the normal weight range over the years” (P264, Age 15, Singles).

A smaller percentage of skaters (4.6%; eighth most frequently cited dimension) reported that skating has taught them about body image. For example, one skater noted that she has learned that success can be achieved with many body types: “In my experience, skating has shown me that I can be muscular as well as curvy and still succeed” (P98, Age 24, Singles). Other perceived positive influences of figure skating on body image are provided in Table 11.

Table 11

Open-Ended Response Summary for Female Sub-Elite Figure Skaters: Positive Influences of Figure Skating on Body Image

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 152)	Percentage
Feeling Positive	54	35.5%
Feeling Good About Myself/Body	36	23.7%
In General	17	11.2%
About the Way I Look	15	9.9%
In Skating Dresses/Attire	4	2.6%
Feeling Confident in Myself/Body	14	9.2%
Feeling Proud of Myself/Body	6	3.9%
Achieving/Maintaining My Body	53	34.9%
To Be Lean/Tone/Muscular	42	27.6%
To Be Thin/Losing Weight	16	10.5%
Being Fit/Active/In Shape	35	23%
Strength	33	21.7%
Knowing My Body Can Do Things	20	13.2%
Being/Wanting to Be Healthy	13	8.6%
Gaining Awareness of Healthy Habits/My Body	7	4.6%
Learning About Body Image	7	4.6%
Having the Right Body for Skating	6	3.9%

Table 11 (cont'd)

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 152)	Percentage
Flexibility	3	2%
Miscellaneous	6	3.9%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Negative influences of figure skating on body image. Participants were asked to indicate whether their experiences in skating have negatively influenced the way they view their body. Those who reported “yes” (70/182 [38.5%]) were prompted to explain how. A total of 70 female sub-elite figure skaters who indicated “yes” provided an open-ended response to this prompt. Seven dimensions, seven themes, and two sub-themes emerged from the data (See Table 12).

The most frequently cited dimension involved becoming self-conscious about one’s body (37.1%). In particular, skaters reported that they were concerned about being too big or too fat (31.4%). For example, one skater noted that these negative body perceptions come from social comparison with thinner skaters: “In some ways in figure skating you compare yourself to other skaters who are very thin and you see your ‘fat rolls’ and you want to get rid of them so you look better” (P247, Age 16, Singles/Ice Dancing). Another indicated that although a muscular lower body is helpful for skating, having to wear larger clothing sizes leads to poor self-confidence: “Skating has also made my calves and thighs huge with muscle, which is great, but a lot of times I have to buy bigger jean sizes to fit the most muscular part of my body, and that always hurts my confidence” (P185, Age 18, Singles).

The second most frequently cited dimension was worrying about or changing one’s body (28.6%). Four skaters (5.7%) reported that they worry about or engage in unhealthy behaviors to

change their body because of critical comments or judgments received from a coach. One skater noted that she still struggles because of these experiences:

I had a coach when I was growing up and developing who always told me I had to lose weight. I developed eating disorders and very bad body image. My newest coach always tells me I look great, but I never believe her. I always hear my old coach in my head telling me to lose weight (P151, Age 23, Singles).

The third most frequently cited dimension involved peers and social comparison (27.1%). One skater reported that seeing other thinner skaters has led her to feel uncomfortable with her body: “I look at the other girls that are skinnier or prettier than me, and it lowers my self-esteem even more. Many of my friends that skate are very thin, and I always feel like I’m being compared to them” (P52, Age 15, Singles).

The fourth most frequently cited dimension was feeling negatively about their bodies because of form-fitting skating attire (11.4%). One skater mentioned that wearing skating dresses makes her increasingly aware of her body’s imperfections: “I definitely notice every flaw when I am in skating attire. My thighs look very large, and I always feel like I could be prettier” (P107, Age 15, Singles). Other perceived negative influences of figure skating on body image are provided in Table 12.

Table 12

Open-Ended Response Summary for Female Sub-Elite Figure: Negative Influences of Figure Skating on Body Image

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 70)	Percentage
Becoming Self-Conscious About My Body	26	37.1%
Because I Am Too Big/Fat	22	31.4%
In General	5	7.1%
Because of My Height	2	2.9%

Table 12 (cont'd)

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 70)	Percentage
Worrying About/Changing My Body	20	28.6%
In General	12	17.1%
Because of Critical Comments/Judgments	8	11.4%
From Coaches	4	5.7%
From Important Others (e.g., parents, judges)	4	5.7%
Peers/Social Comparison	19	27.1%
Skating Dresses/Attire	8	11.4%
Physical Limitations	6	8.6%
Lack of Strength	4	5.7%
Lack of Flexibility	3	4.3%
Failing Due to Body/Appearance	4	5.7%
Being Too Thin	3	4.3%
Miscellaneous	5	7.1%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Positive influences of figure skating on eating and exercise. Participants were asked to indicate whether their experiences in skating have positively influenced the way they eat and/or exercise. Those who reported “yes” (169/184 [91.8%]) were prompted to explain how. A total of 168 female sub-elite figure skaters who indicated “yes” provided an open-ended response to this prompt. Ten dimensions and eight themes emerged from the data (See Table 13).

The two most frequently cited dimensions were eating well (56%) and exercising (56%). Skaters reported eating well both in a general sense (38.7%) as well as to help their skating (17.3%). For example, one skater mentioned that her sport has encouraged her to eat better which has in turn improved her athletic performance: “Figure skating has...prompted me to eat healthier. I tend to skate better when I have a balanced diet. If I take care of myself, then it is easier to improve my skating” (P106, Age 18, Singles). Another noted that her sport has led her

to closely monitor her food consumption as a means of achieving success: “In skating I really have to watch my calorie and sugar intake! It is hard. But that is what I have to do to be successful” (P17, Age 14, Singles). Skaters also reported that figure skating has benefitted their exercise habits both in a general sense (41.7%) as well as to advance their skating (14.9%). For example, one skater indicated that her sport has enabled her to make exercise a routine habit: “I actually have to exercise now, and I just do it without even thinking. A lot of my other non-skating friends have to plan it out, just to go to the gym once a week” (P3, Age 15, Singles, Pairs). Another stated that she has increased her exercise volume to improve her athletic performance: “It takes a lot to get through a skating program, so I have pursued running. I run about 5 times a week to improve my endurance for skating” (P253, Age 13, Singles).

The second most frequently cited dimension was encouragement to be healthy (17.3%). One skater reported that health is a particular emphasis in synchronized skating: “My experiences in skating have just helped me to understand that I am an athlete and how important it is to stay healthy. On synchro especially, my overall health is emphasized” (P229, 15, Synchronized).

The third most frequently cited dimension involved gaining nutritional knowledge from skating (14.9%). Specifically, some skaters reported that they are more aware or conscientious of good eating habits (10.1%). One skater mentioned becoming particularly cognizant of the key ingredients in foods and how they influence her body and performance:

I am aware of what I put into my body (unlike a lot of America). Sometimes I even look up ingredients and see the benefits/detriments they are to the body. I try to be committed to maintaining a healthy diet and body because I know I'll perform better (P290, Age 17, Singles).

In addition to awareness, others noted that they have learned good eating habits from skating (5.4%). One skater reported: “I have learned what is good to eat for normal body function, and I know what foods to stay away from so I don't become unhealthy” (P247, Age 16, Singles/Ice Dancing). Another indicated that she has learned how to fuel her body around practice time:

If I would overeat before or after practice, I felt uncomfortable and that I was falling short of the sport of skating. Over the years I have learned what to eat in order to feel great before and after practice (P150, Age 18, Singles).

A smaller percentage of skaters (4.8%; seventh most frequently cited dimension) reported that skating makes them feel good physically and emotionally. For example, one skater noted that feeling good after skating encourages her to continue healthy behaviors: “Because I feel good when I skate, I want to keep up my healthy eating and exercise to feel healthy and strong” (P159, Age 12, Singles). Another similarly reported: “After skating I want to keep feeling good about myself so I like to plan more exercise for the day and eat foods that will also make me feel good such as fruits and veggies” (P256, 17, Singles).

The eighth most frequently cited dimension involved maintaining a desirable body (3.6%). More specifically, these skaters perceived that their sport is a positive influence on eating and exercise because it helps them to achieve and maintain the body they want. One skater noted: “Skating makes me want to eat healthier and workout longer so I can keep the same body for as long as possible, even if I quit skating” (P60, Age 16, Singles). Another similarly stated: “[Skating] encourages me to build more necessary muscle and eat better to obtain an average body size” (P286, Age 15, Singles/Synchronized).

Three skaters (1.8%; ninth most frequently cited dimension) reported that skating is a positive influence on their eating and exercise because it enables them to be thin, not fat, and to

lose weight. One skater mentioned: “I feel that it is important to eat and exercise right. I feel that if I don't, then I might gain a lot of weight and not improve” (P43, Age 12, Singles). Other perceived positive influences of figure skating on eating and exercise habits are provided in Table 13.

Table 13

Open-Ended Response Summary for Female Sub-Elite Figure Skaters: Positive Influences of Figure Skating on Eating and Exercise

Dimensions, Themes, Sub-Themes	Frequency	Percentage (n = 168)
Eating Well	94	56%
In General	65	38.7%
To Help My Skating	29	17.3%
Exercising	94	56%
In General	70	41.7%
To Help My Skating	25	14.9%
Encourages Me To Be Healthy	29	17.3%
Gaining Nutritional Knowledge	25	14.9%
Becoming Aware/Conscientious Of Good Eating Habits	17	10.1%
Learning Good Eating Habits	9	5.4%
Encourages Me To Be Fit	17	10.1%
Gaining Exercise Knowledge	11	6.5%
Learning About Exercise	7	4.2%
Becoming Aware/Conscientious Of Exercise	4	2.4%
Enjoy Exercising	11	6.5%
Feeling Good Physically/Emotionally	8	4.8%
Maintaining Desired Body	6	3.6%
Being Thin/Not Fat/Losing Weight	3	1.8%
Miscellaneous	4	2.4%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Negative influences of figure skating on eating and exercise. Participants were asked to indicate whether their experiences in skating have negatively influenced the way they eat and/or

exercise. Those who reported “yes” (35/182 [19.2%]) were prompted to explain how. A total of 35 female sub-elite figure skaters who indicated “yes” provided an open-ended response to this prompt. Seven dimensions emerged from the data (See Table 14).

The most frequently reported dimension was under-eating, restricting food, and dieting (31.4%). One skater reported that the pressure to be thin led her to engage in these types of unhealthy eating practices: “The pressure to be thin has caused me to diet and skip meals, and sometimes not to eat at all” (P140, Age 18, Singles). Another indicated that worrying about being fat and unattractive influences her eating habits: “Sometimes I don't eat enough because I feel fat, and I feel my muscles will keep growing until no one will think I'm pretty or skinny” (P223, Age 13, Synchronized). Finally, a third skater noted that she has altered her eating habits to improve performance:

I know I skate better at a weight which I [am] lighter than what is natural for my body, and I had to fight that in the past and sometimes restricted my food more than I should have so that I could try to weigh that (P102, Age 22, Singles/Ice Dancing/Synchronized). Other skaters (17.1%; fourth most frequently cited dimension) noted that skating has negatively influenced their eating and exercise behaviors by causing them to overeat. For example, eating more due to increased energy expenditure was perceived as a negative influence by some skaters: “Sometimes after skating, I will eat so much because I am so hungry” (P242, Age 17, Singles); “Since I skate and work out, I get really hungry so sometimes I will eat too much and/or eat bad foods” (P250, Age 14, Singles). Another reported that worrying about skating has led her to overeat: “When I worry about skating, I will sometimes overeat...and it can actually end up hurting my performance” (P264, Age 15, Singles).

A smaller percentage of skaters (11.4%; fifth most frequently cited dimension) reported engaging in unhealthy eating and exercise behaviors in a general sense. One skater provided several examples:

I have skated for 14+ years so while there have been many positive habits, I have also had periods where I have been distressed and done things I am not proud of-pushed myself too hard, thrown up, stopped eating, etc. It's a fine line between pressure to do well and too much pressure (P185, Age 18, Singles).

Two skaters (5.7%; seventh most frequently cited dimension) noted that although skating has negatively influenced their eating and exercise behaviors in the past, they have learned to overcome them. For example, one skater mentioned:

For awhile, I would always compare my body to other skaters. I learned however, that if I eat healthy and exercise, then my body will look its healthiest. I learned to accept the image of my body as it's healthiest instead of comparing it to other skaters (P150, Age 18, Singles).

Other perceived negative influences of figure skating on eating and exercise are provided in Table 14.

Table 14

Open-Ended Response Summary for Female Sub-Elite Figure Skaters: Negative Influences of Figure Skating on Eating and Exercise

Dimensions, Themes, Sub-Themes	Frequency	Percentage (<i>n</i> = 35)
Under-eating/Restricting Food/Dieting	11	31.4%
Worrying/Obsessing About Eating/Exercise/Body	9	25.7%
Exercising More/Over-Exercising	7	20%
Overeating	6	17.1%
Engaging in Unhealthy Eating/Exercise Behaviors in General	4	11.4%
Making Poor Food Choices	3	8.6%

Table 14 (cont'd)

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 35)	Percentage
Yes, But Learning to Overcome A Negative Body Image and Unhealthy Eating Behaviors	2	5.7%
Miscellaneous	4	11.4%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Evaluation of Secondary Research Questions

The primary purpose of this study was to examine the frequency and psychological predictors of disordered eating in a sample of female sub-elite figure skaters. However, enough data were collected to warrant analysis of the proposed secondary research questions with male figure skaters and address various group comparisons across the sport. Results of these analyses are provided next.

Secondary research question 1. *What is the frequency of disordered eating attitudes and behaviors in male figure skaters?*

An examination of scores on the EAT-26 revealed that 1 of 27 of male figure skaters (3.7%) fell within clinical range of an eating disorder with a score of 23. The mean score on the EAT-26 for male figure skaters was 6.41 ($SD = \pm 6.43$) showing that on average male figure skaters scored well below the 20 point clinical cut-off score and were not symptomatic of eating disorder. The mean EAT-26 score for all male figure skaters contained in the sample (ages 12 to 26) was compared to the mean score derived from normative data with adolescent boys ages 13 to 18 (Whitaker et al., 1989). A one-sample *t*-test revealed no significant difference in mean EAT-26 scores between adolescent boys ($M = 5.2$) and male figure skaters ($M = 6.41$; $t(26) = .98$, $p = .338$).

The frequency of male figure skaters reporting “often,” “usually,” or “always” was determined by each item contained in the EAT-26 (See Table 15). The most frequently endorsed items included displaying self-control around food (51.7%), being aware of the calorie content of foods (41.4%), enjoyment in trying new rich foods (31%), thinking about burning up calories during exercise (31%), taking longer than others to eat meals (20.7%), and being terrified about being overweight (20.7%).

Table 15

Frequency of “Often,” “Usually,” and “Always” Responses to EAT-26 Items Among Male Figure Skaters

Item	Frequency	Percentage
I display self-control around food.	15/29	51.7%
I am aware of the calorie content of foods that I eat.	12/29	41.4%
I think about burning up calories when I exercise.	9/29	31%
I enjoy trying new rich foods.	9/29	31%
I am terrified about being overweight.	6/29	20.7%
I take longer than others to eat my meals.	6/29	20.7%
I particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	5/29	17.2%
I am preoccupied with the thought of having fat on my body.	5/29	17.2%
Other people think that I am too thin.	4/28	14.3%
I am preoccupied with a desire to be thinner.	4/29	13.8%
I eat diet foods.	4/29	13.8%
I engage in dieting behavior.	4/29	13.8%
I find myself preoccupied with food.	3/29	10.3%
I cut my food into small pieces.	3/29	10.3%
I avoid foods with sugar in them.	3/29	10.3%
I feel that others would prefer if I ate more.	2/29	6.9%
I feel that others pressure me to eat.	2/29	6.9%
I feel uncomfortable after eating sweets.	2/29	6.9%
I have gone on eating binges where I feel that I may not be able to stop.	1/28	3.6%
I avoid eating when I am hungry.	1/29	3.4%

Table 15 (cont'd)

Item	Frequency	Percentage
I feel that food controls my life.	1/29	3.4%
I give too much time and thought to food.	1/29	3.4%
I like my stomach to be empty.	1/29	3.4%
I vomit after I have eaten.	0/29	0%
I feel extremely guilty after eating.	0/29	0%
I have the impulse to vomit after meals.	0/29	0%

Secondary research question 2. *What are the psychological characteristics of male figure skaters?*

A one-way within-subjects ANOVA was conducted to compare mean scores for perceived current body shape ($M = 5.19$, $SD = \pm 0.97$), ideal body shape ($M = 5.12$, $SD = \pm 0.73$), and ideal skater body shape ($M = 4.93$, $SD = \pm 0.58$). Results showed no significant difference in mean body shape scores, Wilks' Lambda = .844, $F = (2, 27) = 2.50$, $p = .101$. As illustrated pictorially in Figure 3, mean current body shape is only slightly greater than both ideal body shape and body shape for the ideal skater. Together, these findings suggest that while male figure skaters may demonstrate a small preference for a leaner body contour, they are minimally, if at all dissatisfied with their bodies. A visual comparison of Figures 2 and 3 shows that male figure skaters are far less dissatisfied with their bodies than their female sub-elite counterparts.

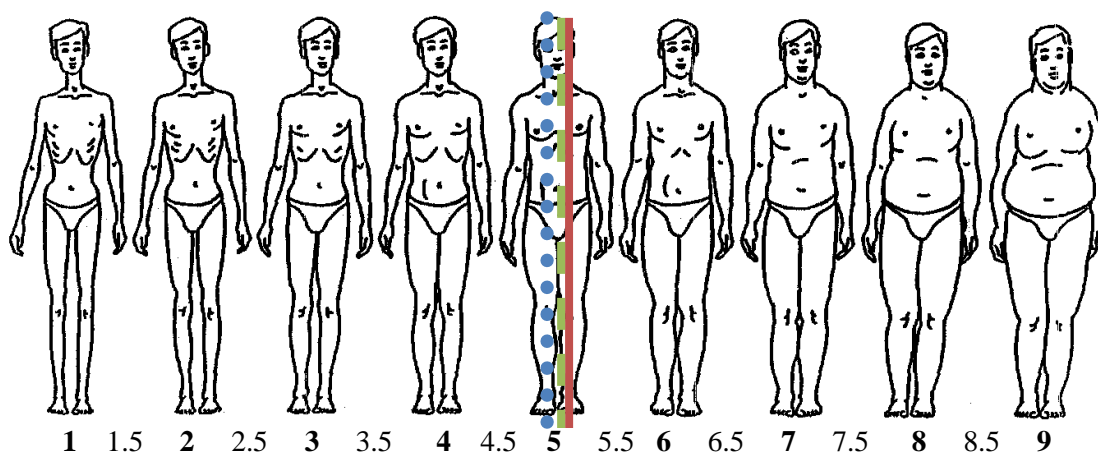


Figure 3. Perceived current, ideal, and ideal skater's body shape for male figure skaters ($n = 29$). Red solid line = perceived current body shape, Green dashed line = perceived ideal body shape, Blue dotted line = perceived ideal skater's body shape.

Means and standard deviations were determined for global scores assessing athletic identity, self-esteem, perceived weight pressures, positive perfectionism, and negative perfectionism. As with female sub-elite figure skaters, the range of possible scores on each of the measures was divided into four proportions. Means are described in the context of the proportion of possible scores in which they fell. Specifically, means approximately within the 0% to 25% range of possible scores were considered low, 25% to 50% were considered low to moderate, 50% to 75% were considered moderate to high, and 75% to 100% were considered high.²

As shown in Table 16, mean athletic identity fell within the 50% to 75% range of possible scores (40 to 55) suggesting that on average male figure skaters identified moderately to strongly with their sport. Mean self-esteem fell within the 75% to 100% range of possible scores (22.5 to 30) indicating that on average male figure skaters had high self-esteem. Mean perceived weight pressures, falling within the 25% to 50% range of possible scores (2.25 to 3.50), shows that on average male figure skaters perceived a low to moderate level of weight pressures in their environment. Finally, mean positive perfectionism fell within the 75% to 100% range of possible scores (80 to 100), while mean negative perfectionism fell within the 25% to 50% range (40 to

60). This finding suggests that on average male skaters possessed high levels of positive perfectionism and low to moderate levels of negative perfectionism.

Table 16

Descriptive Statistics for Psychological Characteristics Among Male Figure Skaters

Psychological Characteristic	<i>n</i>	<i>M</i>	<i>SD</i>	Range of Possible Scores
Athletic Identity	27	51.63	± 10.90	10 to 70
Self-esteem	28	23.96	± 4.04	0 to 30
Perceived Weight Pressures	28	2.72	± 0.65	1 to 6
Positive Perfectionism	28	83.07	± 7.84	20 to 100
Negative Perfectionism	27	57.30	± 11.44	20 to 100

Secondary research question 3. *What are the contributors of disordered eating attitudes and behaviors in male figure skaters?*

For the following statistical analyses, square root transformed disordered eating scores, reflect log transformed self-esteem scores, log transformed perceived weight pressure scores, and reflect log transformed athletic identity scores were used to meet statistical assumptions for a normal distribution. The sample size was not deemed large enough to conduct a multiple linear regression predicting disordered eating or to assess disordered eating as a function of competitive experience. However, correlational analyses were used to assess the relationship between disordered eating and years skating experience, body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity. Results from a Pearson product-moment correlation analysis revealed significant positive relationships among most but not all of the variables of interest. Specifically, disordered eating was positively related to body dissatisfaction ($r = .47, n = 27, p = .014$) and perceived weight pressures ($r = .53, n = 26, p = .006$). Thus, higher levels of body dissatisfaction and perceived weight pressures were associated with higher levels of disordered eating accounting for 22% and 28% of the variance, respectively. Relationships between disordered eating and years skating experience (r

= -.11, $n = 27$, $p = .578$), self-esteem ($r = -.30$, $n = 27$, $p = .128$), negative perfectionism ($r = .16$, $n = 25$, $p = .451$), positive perfectionism ($r = .01$, $n = 26$, $p = .981$), and athletic identity ($r = -.02$, $n = 26$, $p = .911$) were non-significant.

Secondary research question 4. *What is the perceived role of figure skating in shaping body image, eating, and exercise habits in male figure skaters?*

As with their female sub-elite counterparts, male participants responded to the same five items assessing the perceived role of figure skating in shaping body image, eating, and exercise habits. A summary of the close-ended responses from male figure skaters is provided in Table 17. Interestingly, a notable proportion (79.3%) agreed that skating is associated with pressures to lose or maintain weight. However, the majority indicated that skating has positively rather than negatively influenced their body image, eating, and exercise.

Table 17

Close-ended Response Summary for Male Figure Skaters: Role of Figure Skating in Shaping Body Image, Eating, and Exercise Habits

Close-Ended Question	Yes		No	
	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>
Some believe that the sport of figure skating is linked to pressures to lose or maintain weight. Do you agree with this belief? ($n = 29$)	23	79.3%	6	20.7%
In general, have your experiences in skating positively influenced the way you view your body? ($n = 29$)	23	79.3%	6	20.7%
In general, have your experiences in skating negatively influenced the way you view your body? ($n = 28$)	7	25%	21	75%
In general, have your experiences in skating positively influenced the way you eat and/or exercise? ($n = 29$)	25	86.2%	4	13.8%

Table 17 (cont'd)

Close-Ended Question	Yes		No	
	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>
In general, have your experiences in skating negatively influenced the way you eat and/or exercise? (<i>n</i> = 29)	3	10.3%	26	89.7%

Qualitative data from the open-ended responses of male figure skaters, including dimensions, themes, sub-themes, frequencies and percentages, are provided in Tables 18 through 21. In the following section, these results are also described in depth with an illustration of key quotes. When quotes are provided, “P” represents “Participant,” followed by the respective participant number assigned as well as pertinent demographic information, including age, competitive level, and skating focus (i.e., singles, pairs, ice dancing, synchronized).

Why pressures exist to lose or maintain weight in figure skating. Participants were asked to indicate whether they agreed with the belief that figure skating is linked to pressures to lose or maintain weight. Those who reported “yes” (23/29 [79.3%]) were prompted to explain why they thought these pressures existed. A total of 23 male figure skaters who indicated “yes” provided an open-ended response to this prompt. Five dimensions and four themes emerged from the data (See Table 18).

Performance demands was the most frequently cited dimension (60.9%). In particular, 26.1% of male figure skaters reported that pressures exist in skating to lose or maintain weight because of the aesthetic and judged aspects of performance. For example, one skater noted that the aesthetic component is both important and made easier when in shape:

I think yes, but it’s good. Figure skating is more of a dance than an aggressive sport. It is made great by the shapes and lines that are created, and a person who is not in shape

cannot create the same elegant shapes and lines of someone who is leaner (P64, 20, Elite, Singles).

Also within the performance demands dimension, 27.1% indicated that pressures exist to lose or maintain weight because being thinner and smaller benefits skating performance. For example, two skaters reported: “I have felt [the pressures] myself. Heavy skaters don't make good skaters” (P67, Age 21, Elite, Pairs); “Because some people think you need to be thin to be successful” (P66, Age 17 Elite, Singles). Four skaters (17.4%) noted that pressures to lose or maintain weight exist because of the technical aspects of performance, including jumping, spinning, and lifting their partner. For example, one skater mentioned that the technical skills become more difficult with more weight: “Naturally we lose weight while working on our skating every day. If you gain weight, apparently jumping and spinning become harder” (P65, Age 17, Elite, Singles). Another skater indicated that the technical demands place more pressure on female skaters than male skaters: “As a male ice dancer, I am not under as much pressure as the girls to keep my weight below average. However, the girls are made to believe that a lower body weight will make them more appealing to judges and easier to lift” (P22, Age 21, Elite, Ice Dancing). Finally, two skaters (8.7%) reported that pressures to lose or maintain weight exist because of the thin but muscular build necessary for optimal performance. One skater noted: “The optimal combination for figure skating is strong muscular and muscular explosiveness. To achieve one's maximum, he/she must be built of lean muscle, not excessively large, but undoubtedly muscular” (P19, Age 19, Elite, Singles).

The second most frequently cited dimension was important others (21.7%). For example, one skater noted that pressures to lose or maintain weight are due to coaches in particular: “Yes because some coaches think that to be healthy you have to eat only a handful of each thing” (P6,

Age 14, Sub-Elite, Singles). Another skater reported that pressures exist because coaches want their athletes to succeed: “They exist because the coaches want you to be the best you can be” (P27, Age 23, Elite, Ice Dancing).

The third most frequently cited dimension was ideals (13%). For example, two skaters mentioned that expectations to achieve the ideal skating body is an important source of pressure: “In skating there is pressure to maintain a pre-pubescent, ‘perfect’ body type that not everyone can have naturally” (P63, Age 21, Elite, Ice Dancing); “In the type of sport that figure skating is, athletes are of a certain body type (P233, Age 22, Sub-Elite, Singles).

The fourth most frequently cited dimension was bodies of the best skaters (8.7%). Two skaters indicated: “I think these pressures exist because there are so many very thin skaters that do well” (P61, Age 21, Elite, Singles); “I think because all along, there have been no successful large skaters” (P233, Age 22, Sub-Elite, Singles). Other reported reasons why pressures to lose or maintain weight exist in figure skating are provided in Table 18.

Table 18

Open-Ended Response Summary for Male Figure Skaters: Why Pressures Exist to Lose or Maintain Weight in Figure Skating

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 23)	Percentage
Performance Demands	14	60.9%
Attend to Aesthetics/Judging Component	6	26.1%
Being Thin/Small Means Better Skating	5	21.7%
Perform Technical Elements (e.g., jumps)	4	17.4%
Be Thin But Muscular	2	8.7%
Important Others	5	21.7%
Ideals	3	13%
Bodies of the Best Skaters	2	8.7%

Table 18 (cont'd)

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 23)	Percentage
Pressure to Succeed/Be Perfect	2	8.7%
Miscellaneous	2	8.7%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Sources of pressure to lose or maintain weight in figure skating. Participants were asked to indicate whether they agreed with the belief that figure skating is linked to pressures to lose or maintain weight. In addition to explaining why they thought these pressures exist, those who reported “yes” (23/29 [79.3%]) were also prompted to explain where and/or who these pressures came from. A total of 21 male figure skaters who indicated “yes” provided an open-ended response to this prompt. Four dimensions and nine themes emerged from the data (See Table 19).

The most frequently cited dimension was pressure from others (61.9%). Some skaters reported that coaches in particular were an important source of pressure (42.9%). One skater noted: “The pressure is always there from the coaches” (P64, Age20, Elite, Singles). The second most frequently cited dimension was pressure from the self (42.9%). For example, one skater mentioned that the competitive nature of the sport may cause skaters to internalize feelings of self-doubt: “I think they come from skaters who internalize their feelings of inferiority – in skating the rankings are always talked about and it's a competitive lifestyle” (P63, Age 21, Elite, Ice Dancing). A smaller percentage of skaters (9.5%; fourth most frequently dimension) indicated that watching others and social comparison were important sources of pressure. One skater stated: “Just looking at the other skaters, they look good so you work to be like them (P24,

Age 16, Elite, Pairs). Other reported sources of pressure to lose or maintain weight in figure skating are provided in Table 19.

Table 19

Open-Ended Response Summary for Male Figure Skaters: Sources of Pressure to Lose or Maintain Weight in Figure Skating

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 21)	Percentage
Others	13	61.9%
Coaches	9	42.9%
Family/Parents	6	28.6%
Judges	3	14.3%
Peers	3	14.3%
Fans/Audience/Spectators	2	9.5%
Friends	2	9.5%
Other Skaters	2	9.5%
Self	9	42.9%
Culture/Environment	4	19%
Popular Culture	2	9.5%
Skating Culture	2	9.5%
Watching Others/Social Comparison	2	9.5%
Miscellaneous	3	14.3%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Positive influences of figure skating on body image. Participants were asked to indicate whether their experiences in skating have positively influenced the way they view their body. Those who reported “yes” (23/29 [79.3%]) were prompted to explain how. A total of 23 male figure skaters who indicated “yes” provided an open-ended response to this prompt. Five dimensions and two themes emerged from the data (See Table 20).

The two most frequently cited dimensions included feeling positive about their bodies (39.1%) and being fit, active, and in shape (39.1%). Each is discussed in turn. Of the skaters who

felt positive about their bodies, most reported these good feelings in a general sense (27.1%). For example, one skater reported having body satisfaction: “I work out often and am pleased with my body and body type” (P12, Age 19, Elite, Singles). Another mentioned feeling proud: “Yes in the way that when I see that I am in better shape, I take more pride in myself and my body” (P64, Age 20, Elite, Singles). Other skaters noted feeling positive about their bodies specifically because of the way they look (17.4%). For example, one skater reported enjoying his level of fitness and his appearance when compared to the general population: “I enjoy being fit and looking good, especially in a world where many people are overweight” (P62, Age 22, Elite, Singles). Another indicated that he feels positive about himself because of the way he looks in clothing: “Well I work out a lot, and as a result have a lot of muscle mass. I rarely like to wear shirts and if I do, I prefer them to be tight or tank tops” (P25, Age 21, Elite, Ice Dancing).

Among those who reported being fit, active, and in shape, one skater noted that he attributes good performance to being in better physical condition: “If I do well I believe I am in good shape and am one of the better built people” (P219, Age 12, Sub-Elite, Synchronized). Another reported that skating participation is a central reason for being fit: “I feel that skating has put me in awesome shape. I often joke that if I quit skating, I'd have to stop eating because I wouldn't be working anything off” (P233, Age 22, Sub-Elite, Singles). A third skater suggested that skating helps him to stay active on a regular basis: “Because I am always doing exercises, my body is in good shape, and I am moving all the time. I mean active life” (P23, Age 25, Elite, Singles/Pairs).

The second most frequently cited dimension involved achieving and maintaining one's body (26.1%). For example, one skater suggested that skating has helped him to achieve and maintain a lean and muscular shape: “I feel like I have a lean muscular build, and it makes me

feel confident” (P69, Age 16, Elite, Ice Dancing). Other perceived positive influences of figure skating on body image are provided in Table 20.

Table 20

Open-Ended Response Summary for Male Figure Skaters: Positive Influences of Figure Skating on Body Image

Dimensions, Themes, Sub-Themes	Frequency (<i>n</i> = 23)	Percentage
Feeling Positive	9	39.1%
In General	5	21.7%
About the Way I Look	4	17.4%
Being Fit/Active/In Shape	9	39.1%
Changing/Maintaining My Body	6	26.1%
Strength	5	21.7%
Being/Wanting to Be Healthy	3	13%
Miscellaneous	4	17.4%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Negative influences of figure skating on body image. Participants were asked to indicate whether their experiences in skating have negatively influenced the way they view their body. Those who reported “yes” (7/28 [25%]) were prompted to explain how. A total of 7 male figure skaters who indicated “yes” provided an open-ended response to this prompt. Two dimensions emerged from the data.

The most frequently cited dimension was becoming self-conscious about one’s body (42.9% [3/7]). For example, one skater noted feeling self-conscious in a general sense: “I am always aware of my weight and critically judging my body” (P70, Age 22, Elite, Singles). Another skater reported feeling too big: “I am self-conscious about my thigh muscles. Skating requires strong thighs and quads, and because of it I cannot wear thinner pants. That's about it”

(P22, Age 21, Elite, Ice Dancing). Finally, a third skater mentioned feeling insecure about his height: “Because of my height, it's not always easy to be as confident when around non-skaters” (P63, Age 21, Elite, Ice Dancing). The second most frequently cited dimension involved peers and social comparison (28.6% [2/7]). One skater noted: “I think because of skating I compare myself to those around me and tend to be a little critical of my looks” (P21, Age 26, Elite, Ice Dancing). Responses from three skaters (3/7 [42.9%]) could not be categorized into a dimension, theme, or sub-theme and were therefore considered miscellaneous.

Positive influences of figure skating on eating and exercise. Participants were asked to indicate whether their experiences in skating have positively influenced the way they eat and/or exercise. Those who reported “yes” (25/29 [86.2%]) were prompted to explain how. A total of 25 male figure skaters who indicated “yes” provided an open-ended response to this prompt. Six dimensions and six themes emerged from the data (See Table 21).

The most frequently cited dimension was eating well (52%). Skaters discussed eating well in a general sense (32%) and specifically to help their skating (20%). One skater noted: “I always want to maintain the highest level of performance and thus I try to eat and exercise the best ways to maintain this level of performance” (P12, Age 19, Elite, Singles). The second most frequently cited dimension was gaining nutritional knowledge (28%). Specifically, some skaters described how they have become more aware or conscientious of good eating habits because of skating (16%). For example, two skaters reported: “I think about eating healthier stuff to get my muscles happy” (P203, Age 13, Sub-Elite, Ice Dancing); “I am more careful about the foods to eat and what goes into my body. I think about eating more naturally to be more beneficial to my body” (P64, Age 20, Elite, Singles). Other skaters indicated that skating has played an important role in educating them about healthy nutritional habits (12%). One skater suggested that this

knowledge came specifically from coaches: “The coaches talk about eating well, like fruits and health drinks” (P24, Age 16, Elite, Pairs). Finally, a smaller percentage of skaters (16%; fourth most frequently cited dimension) reported that skating encourages them to be healthy. One skater noted: “As an athlete, I’m constantly working towards being as healthy and fit as I can in order to be at my best” (P63, Age 21, Elite, Ice Dancing). Other perceived positive influences of figure skating on eating and exercise are provided in Table 21.

Table 21

Open-Ended Response Summary for Male Figure Skaters: Positive Influences of Figure Skating on Eating and Exercise

Dimensions, Themes, Sub-Themes	Frequency	Percentage (<i>n</i> = 25)
Eating Well	13	52%
In General	8	32%
To Help My Skating	5	20%
Gaining Nutritional Knowledge	7	28%
Becoming Aware/Conscientious Of Good Eating Habits	4	16%
Learning Good Eating Habits	3	12%
Exercising	7	28%
In General	5	20%
To Help My Skating	2	8%
Encourages Me To Be Healthy	4	16%
Enjoy Exercising	2	8%
Being Thin/Not Fat/Losing Weight	2	8%
Miscellaneous	2	8%

Note. Due to double-coding and responses categorized as miscellaneous, the number citing a higher order theme (e.g., dimension or theme) will not always equal the number citing each respective lower order theme (e.g., theme or sub-theme). Similarly, the total number of participants responding to the open-ended prompt will not necessarily equal the number citing each respective dimension.

Negative influences of figure skating on eating and exercise. Participants were asked to indicate whether their experiences in skating have negatively influenced the way they eat and/or exercise. Those who reported “yes” (3/29 [10.3%]) were prompted to explain how. A total of 3

male figure skaters who indicated “yes” provided an open-ended response to this prompt. Although the amount of data was not sufficient to organize into dimensions, themes, and sub-themes, two of these responses are noteworthy. For example, one skater perceived that eating more due to increased energy expenditure was a negative influence: “I’m eating more when I skate more” (P4, Age 15, Elite, Singles). Another noted that he worries about eating because of the association between nutrition and performance: “Sometimes I’m afraid to indulge in something because I think there’s some link between what I eat and performance” (P63, Age 21, Elite, Ice Dancing).

Secondary research question 5. Do disordered eating attitudes and behaviors in figure skaters differ by skating discipline (i.e., singles, pairs, dance, and synchronized)?

H1: Disordered eating attitudes and behaviors will be more frequently reported by figure skaters in disciplines requiring flight patterns (i.e., singles, pairs, ice dancers) than those that do not (i.e., synchronized).

An independent-samples *t*-test was conducted to compare scores on the EAT-26 for the flight pattern group (i.e., singles skaters, pairs skaters, ice dancers; $n = 189$) and the non-flight pattern group (i.e., synchronized skaters; $n = 46$). Hypothesis 6 was not supported as there was no significant difference in scores for the flight pattern group ($M = 2.80$, $SD = \pm 1.30$) and the non-flight pattern group ($M = 3.14$, $SD = \pm 1.42$; $t(233) = -1.55$, $p = .12$). The magnitude of the differences in the means (mean difference = $-.34$, 95% CI: $-.76$ to $.09$) was very small (eta squared = $.01$). Thus, only 1% of EAT-26 scores were explained by flight pattern.

Secondary research question 6. Do disordered eating attitudes and behaviors in figure skaters differ by competitive level?

H1: Disordered eating attitudes and behaviors will be significantly greater in elite figure skaters than sub-elite figure skaters.

An independent-samples *t*-test was conducted to compare scores on the EAT-26 for elite ($n = 99$) and sub-elite figure skaters ($n = 180$). Hypothesis 7 was not supported as there was no significant difference in scores for elite figure skaters ($M = 2.69$, $SD = \pm 1.29$) and sub-elite figure skaters ($M = 2.88$, $SD = \pm 1.30$; $t(277) = -1.21$, $p = .23$). The magnitude of the differences in the means (mean difference = $-.20$, % CI: $-.52$ to $.12$) was very small (eta squared = $.005$). Thus, only 0.5% of EAT-26 scores were explained by competitive level.

Secondary research question 7. Do disordered eating attitudes and behaviors in figure skaters differ by sex?

H1: Disordered eating attitudes and behaviors will be significantly greater in female figure skaters than male figure skaters.

An independent-samples *t*-test was conducted to compare scores on the EAT-26 for male ($n = 27$) and female figure skaters ($n = 256$). Hypothesis 8 was not supported as there was no significant difference in scores for male figure skaters ($M = 2.47$, $SD = \pm 1.16$) and female figure skaters ($M = 2.84$, $SD = \pm 1.30$; $t(281) = -1.42$, $p = .16$). Although the means were in the expected direction, the magnitude of the difference (mean difference = $-.37$, 95% CI: $-.88$ to $.14$) was very small (eta squared = $.007$). Thus, only 0.7% of EAT-26 scores were explained by sex.

Exploratory Analyses

Although beyond the purposes of the original proposal, the size and scope of the sample obtained warranted exploratory analyses. Some of these analyses yielded results that are relevant to the purposes of the study and are described below.

Exploratory research question 1. Do body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity differ by symptom status among female sub-elite figure skaters?

Scores on the EAT-26 were categorized into a symptomatic group (scores ≥ 20 ; $n = 23$) and a non-symptomatic group (scores < 20 ; $n = 153$). An independent-samples t -test was conducted to compare scores for body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity as a function of symptom status. As illustrated in Table 22, female sub-elite figure skaters who were symptomatic of an eating disorder showed significantly greater body dissatisfaction, $t(25.43) = 5.24, p = .001$, perceived weight pressures, $t(166) = 7.14, p = .001$, negative perfectionism, $t(36.01) = 7.53, p = .001$, positive perfectionism, $t(161) = 2.59, p = .010$, and lower self-esteem, $t(26.63) = -3.32, p = .003$, as compared to those who were not symptomatic of an eating disorder. There was no statistically significant difference between symptomatic and non-symptomatic female sub-elite figure skaters in athletic identity scores ($t(170) = .33, p = .745$).

Table 22

Independent-Samples t -test for Psychological Variables of Interest Between Symptomatic and Non-Symptomatic Female Sub-Elite Figure Skaters

	Symptomatic		Non-Symptomatic	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Body Dissatisfaction	2.25	± 0.34	1.86	± 0.24
Self-Esteem	19.17	± 5.18	22.93	± 4.22
Perceived Weight Pressures	3.42	± 0.76	2.18	± 0.76
Negative Perfectionism	72.18	± 8.84	55.89	± 12.90
Positive Perfectionism	85.14	± 8.09	80.52	± 7.55
Athletic Identity	47.73	± 10.87	46.93	± 10.67

Exploratory research question 2. *Can the combination of body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity be used to predict whether female sub-elite figure skaters report a symptomatic score on the EAT-26 (i.e., ≥ 20)?*

A discriminant analysis was conducted to predict whether a female sub-elite figure skater fell within clinical range of an eating disorder. Predictor variables were body dissatisfaction, self-esteem, perceived weight pressures, negative perfectionism, positive perfectionism, and athletic identity. Significant mean differences were observed for all predictors but athletic identity. Statistics for each variable are included in Table 23. The discriminate function revealed a significant association between groups and all predictors except athletic identity, accounting for 28.8% of between group variability. However, closer examination of the structure matrix revealed only four significant predictors, including perceived weight pressures (.755), body dissatisfaction (.693), negative perfectionism (.600), and self-esteem (-.507) with positive perfectionism and athletic identity being poor predictor variables. The cross-validated classification showed that overall 89.2% were correctly classified.

Table 23

Discriminant Analysis for Psychological Variables of Interest Between Symptomatic and Non-Symptomatic Female Sub-Elite Figure Skaters

	Wilks' Lambda	<i>F</i> (1, 146)	<i>P</i>
Body Dissatisfaction	.80	37.66	.001
Self-Esteem	.88	20.17	.001
Perceived Weight Pressures	.77	44.69	.001
Negative Perfectionism	.84	28.25	.001
Positive Perfectionism	.97	4.00	.047
Athletic Identity	.99	.08	.778

CHAPTER V

DISCUSSION

The results of this study are both discouraging and encouraging at the same time. The findings are discouraging in that they support the notion that disordered eating does exist across the sport of figure skating (i.e., affecting 13.1% of female sub-elite figure skaters, 13.2% of female elite figure skaters, and 3.7% of male figure skaters). Disordered eating is clearly a major health concern that must be addressed by those who govern and coach the sport. However, the findings are also encouraging in that the vast majority of figure skaters were not found to be symptomatic of an eating disorder and actually cited a number of benefits of skating on body image, eating, and exercise. The present study suggests that young skaters can and often do learn positive health habits when participating, which is seldom mentioned in other research. Accounts that figure skating should be singled out as a sport that places youth at an abnormally high risk of disordered eating may therefore be re-evaluated. This chapter provides a general summary of the results and discusses them in the context of the relevant literature, while areas for future research are identified throughout. Finally, study strengths and limitations, as well as practical implications of the findings are discussed.

General Summary of Results

The primary purpose of this study was to examine the frequency and psychological predictors of disordered eating in female sub-elite figure skaters. The six-month data collection process across 19 clubs and five states proved to be even more successful than anticipated. Specifically, enough data were collected to also conduct additional analyses with male figure skaters and address various group comparisons across the sport.

Overall, results suggest that disordered eating exists among females at sub-elite levels of competition. However, these skaters may be no more at risk than the general population of adolescent and college-aged females. Disordered eating in female sub-elite figure skaters was significantly predicted by body dissatisfaction, perceived weight pressures, as well as both positive and negative perfectionism. However, perceived weight pressures, body dissatisfaction, negative perfectionism, and self-esteem were the only variables found to discriminate between those who did and did not score within clinical range of an eating disorder. Results also indicate that male figure skaters may be vulnerable to weight pressures and body image issues, however far fewer males than females scored within clinical range of an eating disorder. Across the entire sample, disordered eating was not found to significantly differ as a function of skating discipline, competitive level, or sex.

Female Sub-Elite Figure Skaters

In line with the primary purposes of this study, the following section will discuss results relative to female sub-elite figure skaters. In particular, descriptive data on the frequency of disordered eating and other psychological characteristics, including body dissatisfaction, athletic identity, self-esteem, perceived weight pressures, and perfectionism, are interpreted. Findings on the predictors of disordered eating as well as the role of figure skating in shaping body image, eating, and exercise in this group of athletes are also addressed.

Frequency of disordered eating in female sub-elite figure skaters. A review of the extant literature suggests that disordered eating exists among female figure skaters at elite levels of competition (e.g., Rucinski, 1989; Ziegler, Khoo, Sherr et al., 1998). This is not surprising as pressure to perform at the elite level is presumably higher than lower level skating and because the performance demands tend to favor an increasingly lighter and leaner athlete. Interestingly,

results of the current study show that disordered eating is not only evident among female elite figure skaters (10/76 [13.2%]), but also among those females who have never competed nationally or internationally (23/176 [13.1%]). Thus, despite competing at lower levels, female sub-elite figure skaters are not exempt from the development of disordered eating and may face weight pressures similar to their elite counterparts. Education about body image, good nutrition, and scientifically-based weight management is needed at all levels of skating and should not be reserved solely for the elite.

Unfortunately, there are few reports on the frequency of athletes who are symptomatic of an eating disorder using the 26-item version of the Eating Attitudes Test (EAT-26) to serve as a means of comparison and interpretation. However, one study with female collegiate athletes showed that 27.7% of those in aesthetic sports (i.e., gymnasts, cheerleaders, and divers; $n = 72$), 14.6% of those in team/aerobic sports (i.e., track athletes-field events, golfers, softball players, tennis players, and water polo players; $n = 96$), and 13.6% of those in endurance sports (i.e., basketball players, cross country athletes, and track athletes-middle distance and distance events; $n = 257$) fell within clinical range of an eating disorder (Beals & Manore, 2002). Another study with collegiate female athletes who participated in predominantly non-aesthetic sports (i.e., basketball, crew, cross-country, diving, golf, soccer, softball, swimming, tennis, track and field, volleyball, and water polo) showed that only 6% (12/207) were symptomatic (Doninger, Enders, & Burnett, 2005). Thus, while the frequency of disordered eating in both elite and sub-elite female figure skaters may not reach levels found in other aesthetic sports like gymnastics, cheerleading, and diving, estimates may be higher than or comparable to those found among non-aesthetic sport athletes. This finding is in contrast to the numerous anecdotal accounts

depicted in the introduction of this dissertation. Despite what stories will indicate, an overwhelming presence of disordered eating was simply not found in the current study.

In particular, Joan Ryan's (1995) *Little Girls in Pretty Boxes* targets figure skating as one of the most dangerous sports for the development of disordered eating, body image disturbances, and abuse of youth athletes. The apparent discrepancy between the results of the present study and Ryan's anecdotal account may have occurred for two reasons. First, as a journalist, Ryan did not present any empirical data to support her claims about the scale and scope of disordered eating among female athletes in aesthetic sports. The book makes an argument to change the culture of both figure skating and gymnastics based on a small number of extreme cases and may therefore have overstated the problem. However, it may also be true that Ryan's assumptions were accurate and that the book's negative attention through the media (i.e., interviews on The Oprah Show, news releases, and a movie) prompted these athletic communities to become better educated. For example, a two-part article was published in the sports medicine and science section of *Skating* magazine on the prevention, detection, and treatment of disordered eating (Parker, 1995a, 1995b) in the same year Ryan's book was published. Although in need of expansion and updating, the US Figure Skating website now offers a nutrition section that provides resources to athletes, coaches, and parents on proper nutritional practices in competitive sport (U.S. Figure Skating, 2010). Elite level skaters who struggled with disordered eating are also speaking out about their experiences with intentions of protecting future skating participants (J. Kirk, 2009). Such changes could be helping to foster a culture that is less focused on inappropriate weight management methods, which may have been reflected in the present findings.

Importantly, the frequency of disordered eating identified in the current sample appears to fall between estimates found in other studies with figure skaters. For example, one study using the 40-item version of the EAT with 23 national level female figure skaters (ages 13 to 22) showed that 48% were considered symptomatic of an eating disorder (Rucinski, 1989); whereas, another study of 21 competitive female figure skaters (ages 11 to 16; competitive level not specified) found only 9% (Ziegler, Hensley et al., 1998). However, unlike the present investigation where skaters were enrolled across 19 clubs in five states, participants in these studies were recruited from only one training facility. The large discrepancy in the frequencies reported may suggest that disordered eating is highly dependent upon the culture of the club or training program. It is imperative for researchers to avoid generalizing findings from an isolated training facility, club, or program to all skaters, to be transparent about the representation of their study sample, and to include the broadest sample possible as a means of achieving the most accurate estimations. Researchers will also need to re-examine estimates of disordered eating across figure skating and other sports with the upcoming revisions of the Diagnostic and Statistical Manual of Mental Disorders that will seemingly loosen the criteria for what is considered a clinical eating disorder (American Psychiatric Association, 2012).

When compared to normative data, the mean score on the EAT-26 among female sub-elite figure skaters was comparable to that in adolescent girls (Whitaker et al., 1989) and college-aged females (Garner et al., 1982). Thus, female sub-elite figure skaters may be no more at risk for the development of disordered eating than females in the general population. Normative comparisons also revealed that on average, female sub-elite figure skaters do not resemble clinically anorexic female patients (Garner et al., 1982). While updated normative data are clearly needed, these findings are encouraging such that figure skating may be doing no more

damage than society in general relative to body image, eating, and exercise. However, proponents of the positive youth development movement (e.g., Gould & Carson, 2008; Martinek & Hellison, 2009; Petitpas, Cornelius, Van Raalte, & Jones, 2005) would argue that figure skating, like other athletic endeavors, should aim to improve rather than mirror societal norms. Parents often enroll their children in sport in hopes that their young athletes will reap a number of physical and psychological benefits above and beyond what would be accrued as a non-athlete. Thus, although the data are promising, researchers, practitioners, and the figure skating community may do more to lessen the risk for disordered eating among youth involved in this sport.

While it is critical to address the potential for some figure skaters to develop disordered eating attitudes and behaviors, it is equally important to recognize that the vast majority of female sub-elite figure skaters were not found to be symptomatic of an eating disorder. In fact, the most frequently endorsed items on the EAT-26 included those that may be considered benign or even healthy attitudes and behaviors for a committed athlete (e.g., being aware of the calorie content of foods [54.3%], displaying self-control around food [54.1%], enjoyment in trying new rich foods [45.9%], and thinking about burning up calories during exercise [40%]). These findings are corroborated by the number of skating benefits cited in the qualitative portion of this study, including feeling positive about their body, becoming fit and strong, eating well, exercising for performance and health, and gaining knowledge about both nutrition and physical activity. Future research may address ways to not only minimize the risk for disordered eating in figure skaters, but also maximize the many positive eating attitudes and behaviors that the sport has to offer.

Body dissatisfaction in female sub-elite figure skaters. Descriptive data showed that on average female sub-elite figure skaters perceived their bodies to be larger than desirable both by societal (i.e., the ideal body) and skating standards (i.e., the ideal body for skating). This finding is consistent with results of other studies with figure skaters. For example, using similar body silhouettes, Jonnalagadda, Ziegler, and Nelson (2004) found that their sample of elite female figure skaters ($n = 26$) indicated greater preference for a thinner body size. Ziegler, Kannan, et al. (2005) also found that among female international synchronized skaters ($n = 123$), the majority reported wanting to achieve a thinner body size and be lighter than their current weight. Thus, despite competing at lower levels of competition, female sub-elite figure skaters are also dissatisfied with their bodies.

This finding is not surprising given that the general psychological literature suggests that body dissatisfaction and image are a major concern among young women and girls in general (e.g., Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002; Paxton, Eisenberg, & Neumark-Sztainer, 2006; Presnell, Bearman, & Stice, 2004; Stice & Whitenton, 2002; J. K. Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). However, unlike their female non-athlete counterparts, female figure skaters may face dual pressures from both society and their sport. This phenomenon has been explored among female non-aesthetic sport participants at the collegiate level where athletes must cope with conflicting demands to be thin and feminine by society's standards but strong and muscular for their sport (Krane et al., 2004). Future research may more closely examine figure skaters and other aesthetic-sport participants who may face compounded pressures to be thin. Interestingly, results of the present study revealed that the average perceived ideal body and average perceived body for the ideal skater were nearly identical. Thus, while female sub-elite figure skaters may face pressures to be thin from multiple

sources (i.e., society and their sport), figure skating may not be pushing them to be any thinner than sociocultural norms.

To address future inquiries on body dissatisfaction among figure skaters and other athletic populations, the type and quality of the measures used are important considerations. While the version of the Contour Drawing Rating Scale (CDRS) employed in the present study is a recent and psychometrically sound measure (M. A. Thompson & Gray, 1995; Wertheim et al., 2004), it has been criticized because the figural images do not always match the population being assessed (Gardner & Brown, 2010). This measure may be improved for use with athletes by incorporating illustrations that more closely depict an athletic body shape (e.g., one with muscles) and separate the upper and lower body. Such an instrument would allow for increasingly specific and more accurate estimates of body preferences and dissatisfaction among figure skaters and other athletes across varying sport types.

Athletic identity, self-esteem, perfectionism, and perceived weight pressures in female sub-elite figure skaters. Other descriptive data showed that female sub-elite figure skaters on average possess high levels of athletic identity, self-esteem, and positive perfectionism (i.e., scoring within the upper range of each respective scale) but lower levels of negative perfectionism and perceived weight pressures (i.e., scoring within the lower range of each respective scale). These results are consistent with other studies measuring athletic identity (e.g., Sturm, Feltz, & Gilson, 2011) and perceived weight pressures in athletes (Reel et al., 2010). Although mean positive and negative perfectionism scores were higher among female sub-elite figure skaters than those cited in other studies with athletes (e.g., Haase, Prapavessis, & Owens, 2002; Terry-Short et al., 1995), these elevated scores are consistent with anecdotal evidence and ethnographic data suggesting that the sport of figure skating attracts and promotes perfectionistic

attitudes (Grenfell & Rinehart, 2003). Interestingly, the mean self-esteem score was also higher in female sub-elite figure skaters as compared to athletes in other studies (Armstrong & Oomen-Early, 2009; Neu, 1993). Elevated scores for self-esteem may reflect true levels in this population or social desirability. Together, these descriptive data clearly suggest that on average female sub-elite figure skaters possess positive psychological attributes with a high commitment to their sport, motivation to seek positive rewards, and a sense of self-worth.

Psychological contributors of disordered eating attitudes and behaviors in female sub-elite figure skaters. A primary aim of this study was to explore the psychological contributors of disordered eating in female sub-elite figure skaters. Results indicated that disordered eating does not vary with years in skating, but may increase with competitive experience. In particular, disordered eating differed between those who competed locally versus those participating in regional events, which often signifies a more serious level of commitment and involvement. Unfortunately, comparisons were unable to be made with those who have never competed as well as those competing at the sectional and collegiate level due to small subsample sizes. However, future research may more closely examine competitive experience in sport as a correlate of disordered eating attitudes and behaviors in both figure skaters and other athletes.

Upon inspection of the regression model, five of the six proposed psychological variables were significant predictors of disordered eating in female sub-elite figure skaters, and each is discussed in turn. Body dissatisfaction was the predictor that contributed most to disordered eating. This finding is consistent with the literature often citing this variable as a prominent risk factor in the development of disordered eating symptoms in both athletes (Brannan et al., 2009; Greenleaf et al., 2010) and non-athletes (Stice, 2002). Importantly, other research suggests that

disordered eating may develop among figure skaters even in the absence of marked body dissatisfaction (Ziegler, Khoo, Sherr et al., 1998). Thus, body dissatisfaction may be an important but not pre-requisite sign of disordered eating in figure skaters.

Perceived weight pressures was the second strongest predictor of disordered eating in the present study. This finding supports other literature indicating that weight pressures (e.g., from coaches, peers, parents, skating attire, and required standards of the sport) contribute to the development of unhealthy weight control habits and a poor body image (Galli et al., 2011; Reel et al., 2010; R. A. Thompson & Sherman, 2010; R. A. Thompson & Sherman, 1993). Thus, although female sub-elite figure skaters do not on average perceive high levels of weight pressure in their immediate environment, those that do may be increasingly vulnerable to disordered eating, especially in combination with other risk factors. This finding speaks to the important role of the environment in shaping attitudes and behaviors around eating, exercise, and body image.

In contrast to predictions based on previous research (e.g., Dunn et al., 2011; Haase, 2011; Haase et al., 2002; Terry-Short et al., 1995), positive perfectionism was not only positively associated with disordered eating in female sub-elite figure skaters, but also made a significant contribution to disordered eating over and above that of negative perfectionism. Moreover, although negative perfectionism significantly predicted disordered eating as expected (Dunn et al., 2011; Haase, 2011; Haase et al., 2002), the contribution was small. These findings may be explained in two ways. First, skaters may in fact be both positively and negatively motivated to achieve standards associated with performance success in their sport. For example, some may engage in disordered eating behaviors to gain the positive reinforcement associated with a light and lean figure, such as better performance scores and ease of jumping (positive perfectionism)

or to avoid the negative consequences associated with having a less than ideal body type for skating, such as criticism from a coach (negative perfectionism). Second, these findings may also reflect measurement issues with the Positive and Negative Perfectionism Scale (PANPS). A recent study demonstrated concern over the factor structure of the PANPS for use with athletes, college students, and clinically anxious and depressed patients (Egan, Piek, Dyck, & Kane, 2011). Specifically, positive perfectionism was not in fact associated with positive adjustment, which suggests that the positive and negative perfectionism sub-scales may not accurately represent the constructs intended to be measured (Egan et al., 2011). In further support of possible measurement issues, Haase and Prapavessis (2004) developed a shortened version of the PANPS with a different factor structure for use with athletes. However, use of this factor structure did not change the results of the present study. Future research should not only address the psychometric properties of the instrument, but also the conceptual differences between positive and negative perfectionism.

Extant research suggests that self-esteem may be an important predictor of disordered eating in both non-athletes (Button et al., 1997; Button, Sonuga-Barke, Davies, & Thompson, 1996; Shea & Pritchard, 2007) and athletes (e.g., Arthur-Cameselle & Quatromoni, 2011; Engel et al., 2003; Petrie et al., 2009). Interestingly, findings in the present study are mixed regarding this hypothesized relationship. Although negatively related to disordered eating as expected, self-esteem was not a significant predictor of disordered eating in female sub-elite figure skaters. Ferrand, Champely, and Filaire (2009) similarly found that self-esteem did not predict EAT-26 scores among French non-athletes, rhythmic gymnasts, and synchronized swimmers and actually identified body esteem as a better predictor. Other psychological variables such as body dissatisfaction, perceived weight pressures, and perfectionism may be more critical than self-

esteem in the development of disordered eating in figure skaters and similar aesthetic sport athletes.

In contrast, the discriminant function analysis showed that self-esteem played an important role in discriminating between those female sub-elite figure skaters who were and were not symptomatic of an eating disorder. Petrie and colleagues (2009) also found that self-esteem was an important discriminating factor between symptomatic and asymptomatic college female athletes. Thus, while self-esteem may be associated with disordered eating and adequately distinguish between symptomatic and asymptomatic groups, it may not always predict disordered eating above and beyond other strong risk factors. This is consistent with Baumeister and colleagues (2003) who concluded that the role of self-esteem in the development of disordered eating is variable. Specifically, they reported that it is not clear whether self-esteem is a cause or consequence of an eating disorder and that the relationship between self-esteem and disordered eating may be highly dependent upon the presence of other risk factors such as perfectionism and body dissatisfaction. Among athletic populations, prospective studies and advanced statistical modeling (e.g., structural equation modeling) may be used to better understand the role of self-esteem in the development of disordered eating.

Finally, athletic identity was also assessed as a predictor of disordered eating in female sub-elite figure skaters. Only two other studies have examined the relationship between athletic identity and disordered eating (Gapin & Petruzzello, 2011; Jones et al., 2005) and never as a predictor. It was expected that a strong athletic identity might contribute to skaters' motivation to engage in disordered eating behaviors as a means of constructing a desirable image within the skating community. However, athletic identity demonstrated the weakest relationship and did not significantly predict disordered eating in the present study. Identification with one's sport may

therefore not be an important determinant in the development of disordered eating. However, this finding may also shed light on a limitation of the Athletic Identity Measurement Scale (AIMS). Specifically, the AIMS only examines identity with one's sport and does not address identities across multiple domains. It may be true that skaters with an unbalanced identity towards skating alone (e.g., skating is the only important component to my sense of self) may be more vulnerable to disordered eating than those with a balanced identity across life domains (e.g., I identify strongly with skating in addition to school and family life). Development of a measure examining multiple identities may not only benefit research examining disordered eating among figure skaters, but also other identity research conducted within the sport context.

Although the psychological predictors included in this study were deemed both important and appropriate based on previous literature, future research should address the variance that was *not* explained in this and other studies. For example, it has often been assumed in the sport literature that eating disorders occur when a highly committed and perfectionistic athlete is met with unreasonable weight pressures from both society and the athletic environment (e.g., R. A. Thompson & Sherman, 2010). While this is a valid and empirically supported argument, a growing body of literature among non-athletes suggests that eating disorders are not solely a social and psychological syndrome and that genetics are also an important consideration (Striegel-Moore & Bulik, 2007). For instance, figure skaters who develop disordered eating may have entered the sport with a predisposition for such a condition and then received reinforcement for their disordered eating behaviors in the skating environment. Future research may consider a broader range of explanations for the etiology of disordered eating in figure skaters and other athletes.

Role of figure skating in shaping body image, eating, and exercise in female sub-elite figure skaters. The role of figure skating in shaping body image, eating, and exercise among female sub-elite figure skaters was examined through a series of open and closed-ended questions. Results showed that nearly 60% believed that figure skating is linked to pressures to lose or maintain weight. Although prominent, this proportion is less than that found in other research with figure skaters. For example, two studies examining Canadian female dance and pair skaters found that 94% ($n = 32$) and 92.7% ($n = 41$), respectively, believed that there are pressures associated with their sport to lose or maintain weight (Taylor & STE-Marie, 1999, 2001; Zatalan & Zatalan, 2003). The apparent discrepancy between the current study and other literature may be due to change over time where skaters are perceiving fewer weight pressures than previously or sample selection bias among each respective study (e.g., differences in geographic region, skating clubs). Considered together, it appears that the majority of figure skaters perceive that some degree of weight pressures exist in their sport.

Interestingly, results on perceived weight pressures differed depending on how the variable was assessed in the present study. Despite the majority reporting that weight pressures exist in their sport as measured by a closed-ended question, the mean perceived weight pressure score was quite low as measured by the female version of the Weight Pressures in Sport scale (WPS-F). Importantly, the closed-ended question contained in the survey asked about the existence of weight pressures in the sport in general (i.e., Some believe that the sport of figure skating is linked to pressures to lose or maintain weight. Do you agree with this belief?), while the WPS-F tended to question skaters about their firsthand experiences (i.e., *my* skating peers notice if *I* put on weight). Thus, while most female sub-elite figure skaters would agree that skating is linked to weight pressures potentially because of media stories they have heard or the

public stigma associated with skating and disordered eating, fewer may have actually experienced these weight pressures themselves.

In addition, because most of these skaters agreed that their sport is linked to weight pressures, one would assume that most would also report that skating has negatively influenced their body image, eating, and exercise. However, the opposite was true in the present study. Specifically, an overwhelming majority (i.e., between 82% and 92%) indicated that skating has positively influenced their body image, eating, and exercise while a much smaller proportion (i.e., between 19% and 39%) reported a negative influence. The disordered eating literature often assumes that weight pressures perceived in the athletic environment are always harmful, especially when the word “pressure” carries such a negative connotation. However, these results suggest that not all skaters are adversely affected by negative weight pressures and that some may actually perceive these weight pressures to be positive such that they inspire healthy eating and exercise behaviors that benefit skating and quality of life. This was exemplified by one male skater who reported “yes, but [weight pressure] is good.” The development of body image disturbances and disordered eating may have less to do with whether weight pressures exist and more to do with how they are perceived. For example, the difference between those positively versus negatively influenced by weight pressures may vary as a function of personal characteristics (e.g., the ability to cope with external pressures) as well as the interaction with the environment (e.g., how comments about weight, eating, and exercise are delivered by important others, including coaches, parents, peers, and judges, and how they are received). Future research may more carefully distinguish between the impact of positively versus negatively perceived weight pressures in athletic environments.

Male Figure Skaters

As part of a series of secondary analyses, the following section discusses results relative to male figure skaters. In particular, descriptive data on the frequency of disordered eating and other psychological characteristics are interpreted. Findings on the role of skating in shaping body image, eating, and exercise in this group of athletes are also addressed. When interpreting results, it should be noted that the majority of male figure skaters in the present study competed at the elite level.

Frequency of disordered eating in male figure skaters. Only one male skater (1/27 [3.7%]) was found to be symptomatic of an eating disorder with a score of 23, which is only slightly over the 20-point clinical cut-off. This proportion is comparable to that found among competitive male body builders (2/40 [5%]) (Pickett, Lewis, & Cash, 2005), elite male rowers (2/31 [6%]) (Terry et al., 1999), elite male judoists (0/12 [0%]), and elite male cyclists (0/15 [0%]) (Filaire et al., 2007). Results of the present study suggest that on average male figure skaters are not symptomatic of an eating disorder and that they are no more at risk than their male adolescent counterparts. Moreover, far fewer male figure skaters fell within clinical range than elite (10/76 [13.2%]) and sub-elite female figure skaters (23/176 [13.1%]) in the same sample.

Similar to female sub-elite figure skaters, the most frequently endorsed items on the EAT-26 by male figure skaters may be considered benign or even healthy attitudes and behaviors for a committed athlete (e.g., displaying self-control around food [51.7%], being aware of the calorie content of foods [41.4%], enjoyment in trying new rich foods [31%], thinking about burning up calories during exercise [31%]). However, while only one male skater fell within clinical range, some male skaters still endorsed symptoms of disordered eating that may be cause

for concern. For example, 20.7% reported being often, usually, or always terrified about being overweight, 17.2% being preoccupied with the thought of having fat on their body, 13.8% engaging in dieting behavior, and 13.8% being preoccupied with a desire to be thinner. Future research examining disordered eating with larger sample sizes is needed to further explore the scale, scope, and severity of disordered eating among male aesthetic sport athletes in general and male figure skaters in particular.

Psychological characteristics of male figure skaters. Descriptive data suggest that on average male figure skaters perceived their current body shape to be only slightly greater than both their ideal body shape and the ideal body shape for skating. Thus, male figure skaters may only be minimally dissatisfied with their bodies, which is in marked contrast to their female sub-elite counterparts who showed a much larger average discrepancy between current and ideal body shapes. This finding is consistent with a study of 49 elite figure skaters where females had greater body dissatisfaction scores than males (Jonnalagadda et al., 2004) and other studies comparing male and female non-athletes (Neumark-Sztainer et al., 2002; Paxton et al., 2006; Presnell et al., 2004; Stice & Whitenton, 2002; e.g., J. K. Thompson et al., 1999). However, it is important to note that male figure skaters still reported a preference for a thinner rather than larger body contour. This may be a product of the aesthetic demands of their sport that differ from other sport types, such as football and ice hockey where size lends an advantage. Future research may further examine the demands for size versus leanness among males participating in varying types of sports.

Other descriptive data showed that male figure skaters possessed similar psychological characteristics as their female sub-elite peers. Specifically, they showed higher levels of athletic identity, self-esteem, and positive perfectionism (i.e., scoring within the upper range of each

respective scale) and lower levels of negative perfectionism and perception of weight pressures in their environment (i.e., scoring within the lower range of each respective scale). Comparisons to the existing literature and possible explanations for these results were already discussed in the previous female sub-elite section of the discussion. Because explanations for the findings among male figure skaters are the same, this discussion is not repeated here.

Psychological contributors of disordered eating attitudes and behaviors in male figure skaters. Interestingly, correlational analyses between various psychological variables and disordered eating did not yield the same results for male figure skaters as for their female sub-elite counterparts. Specifically, only body dissatisfaction and perceived weight pressures were significantly associated with disordered eating in male figure skaters. Given that athletic identity demonstrated the weakest relationship and did not predict disordered eating in female sub-elite figure skaters, it is not surprising that athletic identity was not related to disordered eating in males. However, the non-significant relationship between disordered eating and the remaining psychological variables (i.e., self-esteem, positive perfectionism, and negative perfectionism) is in contrast to the relationships found among female sub-elite figure skaters and may reflect the limited size of the male sample. It is also possible that because only a small number of male skaters reported elevated levels of disordered eating, few individual difference factors became evident with such a homogenous sample. Larger sample sizes may be employed to better address the psychological contributors of disordered eating in male figure skaters with the notion that body dissatisfaction and perceived weight pressures may be important risk factors.

Role of figure skating in shaping body image, eating, and exercise in male figure skaters. A thorough understanding of the role of figure skating in shaping body image, eating, and exercise in male figure skaters was limited by the number of males included in the study.

However, the data collected provides preliminary insight that may be examined in a follow-up qualitative study employing in-depth interviews. Similar to their female sub-elite counterparts, the results of the present study showed that a large proportion of male figure skaters (79.3%) perceived that skating is associated with pressures to lose or maintain weight. However, the majority reported that skating has had positive influences on their body image, eating, and exercise. Only seven male figure skaters perceived that skating has had a negative influence on the way they viewed their bodies, and only three reported a detrimental impact on eating and exercise. Interestingly, males who reported being negatively influenced by skating cited themes similar to the females in the study, including being self-conscious about their body, comparing their bodies to others, and concern over eating. Together, these findings suggest that as with females, the sport of figure skating has the potential to positively and negatively influence male figure skaters relative to body image, eating, and exercise. The small but important negative influence of weight pressures on male figure skaters is consistent with a growing body of research indicating that male athletes are not immune to body image disturbances and unhealthy weight control methods and must not be overlooked within the academic literature (e.g., Galli & Reel, 2009; Petrie et al., 2008; Reel & Gill, 1998).

Disordered Eating Across Figure Skating

Group comparisons made across the entire sample of figure skaters suggest that disordered eating does not significantly differ by skating discipline (i.e., singles, pairs, ice dancing, synchronized) or competitive level (i.e., elite, sub-elite). Interestingly, although in the expected direction, disordered eating also did not significantly differ by sex. This is surprising, especially when being female is believed to be the strongest risk factor for developing an eating disorder (Striegel-Moore & Bulik, 2007). However, mean disordered eating scores were quite

low for both males and females in this study. Future research may re-examine possible sex differences with a larger number of male skaters.

In addition, age was not significantly related to disordered eating. In fact, those who scored within clinical range of an eating disorder were as young as 12 and as old as 25 and covered nearly the entire age span of the sample. Thus, although the majority of skaters do not fall within clinical range of an eating disorder (249/283 [88%]), disordered eating attitudes and behaviors do exist among both males and females across age, skating discipline, and competitive level. Prevention and intervention efforts inclusive of all skaters may therefore be more useful than those targeted towards a specific sub-population.

Practical Implications

This study offers a number of practical implications for researchers, practitioners, and important stakeholders in the figure skating community. Specifically, the data collection process posed a number of obstacles due to the stigma associated with disordered eating in figure skating (e.g., some administrators were hesitant to have the issue studied). This sport has traditionally been criticized for the weight and appearance demands that are associated with performance success. For example, Ryan's (1995) book *Little Girls in Pretty Boxes* exposed the dark side of figure skating by highlighting cases of disordered eating that occurred at the most elite levels of competition. This book attempted to address a potential problem by "outing skating" and instilling fear in its participants. Unfortunately, such an approach may have elicited more of a defensive reaction than a productive one. As mentioned previously, some efforts have been made to educate the figure skating community, which may have in part come from the negative attention that the book produced (e.g., a two-part article in *Skating* magazine in 1995, nutritional resources on the US Figure Skating website). However, these efforts are quite small. Research

projects and educational programs attempting to address these sensitive issues are seldom, if at all supported by major gatekeepers in the figure skating community. In fact, some coaches have denied all research opportunities in fear of bringing bad publicity to their athletes, their coaching, and the sport. It is imperative that sport science researchers and practitioners find ways to overcome this stigma.

One way to convince gate keepers that it is safe to address politically sensitive topics is to adopt a strength-based approach. Consistent with the positive psychology movement (Seligman & Csikszentmihalyi, 2000), projects should be conducted with the purpose of using the findings to not only highlight ways of minimizing possible detriments associated with the sport but also maximizing important strengths of skating participation. As illustrated in the current study, skaters reported many positive effects of their skating participation on body image, eating, and exercise that should not be ignored. In fact, given the current obesity crisis and physical inactivity epidemic, these positive influences could play a key role in keeping kids healthy. While we need to be very concerned with the negative influences as they lead to important physical and psychological consequences, it is also critical to emphasize the positive and healthy behaviors the sport can teach. Such an approach may foster greater openness and receptivity to valuable research and programming efforts, improve transparency, and lessen fears associated with empirical data.

Importantly, a positive psychology approach does not ignore the significance of minimizing risk factors. In the present study, the 12% of symptomatic figure skaters across the entire sample are worthy of attention. In addition, although only a small proportion of figure skaters were considered symptomatic of an eating disorder, it is important to also examine the eating attitudes and behaviors of those who may not necessarily be considered at risk for a

clinical condition. For example, a notable proportion of both male and female figure skaters reported that they are often, usually, or always terrified about being overweight, preoccupied with the thought of having fat on their body, consumed with a desire to be thinner, and engage in dieting behavior. These self-reported attitudes and behaviors are not enough to warrant an eating disorder diagnosis in isolation, but have been shown to predict disordered eating in other studies (Killen et al., 1996; Rosendahl et al., 2009). If left unaddressed, they may serve as precursors to the development of a poor body image and/or disordered eating over time.

Practitioners may work to both maximize the benefits of the sport and minimize the risks of disordered eating among figure skaters in several ways. For example, the most frequently cited reason for weight pressures in skating were performance demands (i.e., the fact that jumping, spinning, lifting, and artistic scores are made easier with a lighter and leaner athlete). Sport psychology practitioners and coaches cannot change the requirements of the sport. However, they can teach figure skaters about the importance of appreciating their athletic strengths, show them how to safely manage any current stressors related to performance, and assist them in developing the coping skills necessary to buffer the impact of negative weight pressures. Sport nutritionists and coaches may also educate figure skaters about the myths associated with nutrition and performance (e.g., thinner always means better skating, the best and only way to lose weight is to restrict your eating) and show them how they can use their sport to get smart about eating and exercising to sustain health over the lifespan. Importantly, many figure skaters noted that their skating participation has already helped them to learn about body image as well as healthy eating and exercise. Thus, it is critical that both researchers and practitioners identify who is doing the educating and build upon what the figure skating community may already be doing quite well.

Other results showed that the most frequently cited source of weight pressures included significant others (i.e., coaches, other skaters, parents, and judges). Thus, educational efforts may be designed for important stakeholders in the figure skating community to help foster environmental changes that promote healthy and productive discussions on nutrition, body size, and performance. For example, consistent with other literature (Kerr et al., 2006; Rosen & Hough, 1988), critical comments from coaches were an important negative influence of skating on body image, eating, and exercise in the current study. Educating coaches not only on the nutrition-performance relationship, but also on if, when, and how to communicate with their athletes about these issues is warranted.

In addition to performance demands and pressure from important others, social comparison was both a reported weight pressure and negative influence on body image among female sub-elite figure skaters in particular. Interestingly, recent studies have shown that high performance-orientations and ego-involved goals are associated with disordered eating in figure skaters, gymnasts, and other athletes (e.g., de Bruin, Bakker, & Oudejans, 2009; Duda & Kim, 1997; Scoffier, Gernigon, & d'Arripe-Longueville, 2012). In a sport where performance outcomes are so contingent upon appearance and where the attire so readily reveals body shape and size, it is unsurprising that performance and ego-involved motivational strategies are linked to disordered eating among skaters. Sport psychology practitioners often take efforts to help athletes develop a task or mastery oriented approach, in which the athlete adopts a self rather than social-referenced sense of competence, to assist in improving performance. However, as the aforementioned evidence suggests, these efforts may also positively impact body image, eating, and exercise, especially in sports where appearance demands are high and body comparisons are likely.

Finally, gaining an understanding of the psychological predictors of disordered eating better informs the development of comprehensive screening instruments, prevention, and intervention programs. Specifically, results of the present study show that indications of body dissatisfaction, perception of negative weight pressures, and perfectionism may be important detection tools for unhealthy eating attitudes and behaviors in this group of athletes. Based on the results of the regression model and discriminant function analysis, programs aimed to teach athletes about respecting their bodies and coping with negative weight pressures may be more effective than those only aimed to enhance global self-esteem. In line with a strengths-based approach, these same programs may also assist athletes in developing an awareness of the ways that skating has and can continue to improve health and performance with the proper choices.

Strengths and Limitations

The present study demonstrates a number of strengths. For example, to the primary investigator's knowledge, 301 participants is the largest sample of figure skaters ever obtained, which has allowed group comparisons not possible in previous studies. Although not a nationally representative sample, participants in the current study represented 19 clubs across five states and thus provided the broadest sample of US figure skaters assessed to date. This study was the first to more closely examine disordered eating among male figure skaters and to test athletic identity as a predictor of disordered eating attitudes and behaviors. Using a mixed method that employed both quantitative and qualitative methodologies to address the pertinent research questions strengthened the data.

While the strengths of this study are important, the interpretation of results is also bound by several limitations. Specifically, this study was limited by the self-report nature of the surveys and the ability and willingness of athletes to honestly and accurately respond to survey items.

Participation was voluntary and may have excluded athletes who either did not see the issue as important or were uncomfortable reporting on the topic because they currently struggle with clinical or subclinical forms of an eating disorder. While the current study contained the broadest and largest sample to date, the results are based on a convenience sample of figure skaters and limited to 19 clubs across five states in the Northeast and Midwest. Although there were several instances where skaters represented additional US regions and other countries, the results of the present study may differ from those obtained from a random and more representative sample of figure skaters nationally and internationally. Moreover, disordered eating was not assessed by figure skating club or training program membership. Given the potential environmental influence of the club or training program culture on eating and exercise behaviors, the variance in disordered eating scores may be accounted for by this variable and should be examined in future studies. For example, a social network analysis may be used to explore how disordered eating varies in athletes nested within a coaching staff and within a club or training program. Finally, this study was also limited by the inability to determine causal relationships between variables due to the nature of field research and the lack of a true experimental design.

Conclusions

Results suggest that figure skating has the potential to both positively and negatively influence body image, eating, and exercise. The majority of figure skaters were not found to be symptomatic of an eating disorder and actually reaped a number of benefits relative to body image, eating, and exercise from their figure skating experience. Perceived positive influences are encouraging such that while some figure skaters certainly perceive negative influences of skating, all the news is not bad. Hence, while there should be concern about weight pressures that lead to unhealthy attitudes and behaviors, researchers and practitioners should not

automatically assume that all figure skaters are negatively influenced and that the sport has no redeeming qualities in this regard.

While highlighting the strengths of figure skating, it is also important to recognize the smaller proportion of figure skaters who do show signs of disordered eating attitudes and behaviors. Education-based prevention efforts inclusive of all figure skaters, identification of those figure skaters who may be at risk, as well as interventions for those already struggling are important considerations for the figure skating community. Promoting positive body image and appropriate eating and exercise behaviors is not only beneficial to the physical and psychological health of youth skaters, but also skating performance. A dual-pronged approach aimed to both minimize the detriments and maximize the benefits associated with figure skating will allow greater opportunities for productive research and applied work in this area.

FOOTNOTES

¹ Although data on training regimen (e.g., hours per week spent training for skating) and reasons for participation (e.g., primary reasons for involvement) were collected, results are not presented as the data are not pertinent to the research questions in this study.

² When means fell on the cut-point (i.e., between two proportions), a conservative approach was taken and were always classified in the lower proportion.

APPENDICES

APPENDIX A

Informed Consent/Assent Forms

Parental Permission Form: Participants Ages 12 to 17 Years

Dear Parent/Legal Guardian and Skater,

My name is Dana Voelker, and I am a Doctoral student in the Department of Kinesiology at Michigan State University. As a former figure skater, I am interested in learning about the eating, exercise, and other psychological factors critical to the optimal development of skaters ages 12 and over across a range of skating disciplines (i.e., singles, pairs, ice dancing, synchronized) and competitive levels. This study is being conducted under the supervision of my advisor, Dan Gould, PhD. Completion of this study is part of my PhD requirements and has been approved by your skating club official, program director, and/or coach. As such, I would like to invite you/your child skater to participate in this study. Information gathered in this project will guide efforts to enhance the positive aspects of skating, promote optimal development and performance in skaters, and therefore benefit skaters, parents, coaches and judges at all levels of participation.

Your child skater will be asked to complete a packet of surveys at a predetermined date and time. All surveys will be administered by me and will take approximately 20 minutes to complete. He/she may benefit from the reflective nature of the questions and use it as an opportunity to reflect or think about his/her attitudes and beliefs. Although we believe that participation in this research study will pose little if no risk to your child skater, we understand that your child skater may not want others to see his/her responses. While we do not ask for your child skater's name anywhere on the surveys, they may be identifiable based on the demographic information requested. To protect his/her privacy, all surveys will be collected as soon as they are completed and kept in a folder with me at all times while at the rink. Consent forms and surveys will be separated and shuffled to ensure that your child skater's responses remain anonymous. All data will be treated as confidential and will not be shared with anyone beyond the researchers involved in this project.

Your child skater's participation is completely voluntary. He/she may decide at any point during survey administration to discontinue all participation and not have his/her responses used in any form. Your child skater may also refuse to answer any question. In appreciation of your child skater's voluntary participation, he/she will receive a sport mental skills training packet designed specifically for skaters.

If you or your child skater have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact (Dana K. Voelker, (412) 977-7836,

voelkerd@msu.edu, 207 IM Circle, MSU, East Lansing, MI 48824) or my supervisor (Dr. Dan Gould, (517) 432-0175, drsgould@msu.edu, 210 IM Sport Circle, MSU, East Lansing, MI 48824).

If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 207 Olds Hall, MSU, East Lansing, MI 48824.

Parent/Legal Guardian

To allow your child to participate in this study, you may email Dana Voelker at voelkerd@gmail.com with the name of your child skater(s) *or* you may sign, date, and return a hard copy of this form to Dana Voelker.

Parent/Legal Guardian Signature

Date

Skater Consent Form: Participants Ages 18 and Over

Skater Assent Form: Participants Ages 12 to 17 Years

Dear Skater,

My name is Dana Voelker, and I am a Doctoral student in the Department of Kinesiology at Michigan State University. As a former figure skater, I am very interested in learning about the eating, exercise, and other psychological factors critical to the optimal development of skaters ages 12 and over across a range of skating disciplines (i.e., singles, pairs, ice dancing, synchronized) and competitive levels. This study is being conducted under the supervision of my advisor, Dan Gould, PhD. Completion of this study is part of my PhD requirements and has been approved by your skating club official, program director, and/or coach. As such, I would like to invite you to participate in this study. Information gathered in this project will guide efforts to enhance the positive aspects of skating, promote optimal development and performance in skaters, and therefore benefit skaters, parents, coaches and judges at all levels of participation.

You will be asked to complete a series of surveys at a predetermined date and time. All surveys will be administered by me and will take approximately 20 minutes to complete. You may benefit from the reflective nature of the questions and use it as an opportunity to reflect on your attitudes and beliefs. Although we believe that participation in this research study will pose little

if no risk to you, we understand that you may not want others to see your responses. While we do not ask for your name anywhere on the surveys, you may be identifiable based on the demographic information requested. To protect your privacy, all surveys will be collected as soon as they are completed and kept in a folder with me at all times while at the rink. Consent forms and surveys will be separated and shuffled to ensure that your responses remain anonymous. All data will be treated as confidential and will not be shared with anyone beyond the researchers involved in this project.

Your participation is completely voluntary. You may decide at any point during survey administration to discontinue all participation and not have your responses used in any form. You may also refuse to answer any question. In appreciation of your voluntary participation, you will receive a sport mental skills training packet designed specifically for skaters.

If you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact (Dana K. Voelker, (412) 977-7836, voelkerd@msu.edu, 207 IM Circle, MSU, East Lansing, MI 48824) or my supervisor (Dr. Dan Gould, (517) 432-0175, drdgould@msu.edu, 210 IM Sport Circle, MSU, East Lansing, MI 48824).

If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 207 Olds Hall, MSU, East Lansing, MI 48824.

By signing below, you are agreeing to participate in this study.

Skater Signature

Date

APPENDIX B

Survey Battery: Example For Female Sample

Part A. Please mark an “X” in the space that best reflects the extent to which you agree or disagree with each statement in relation to your own skating participation.

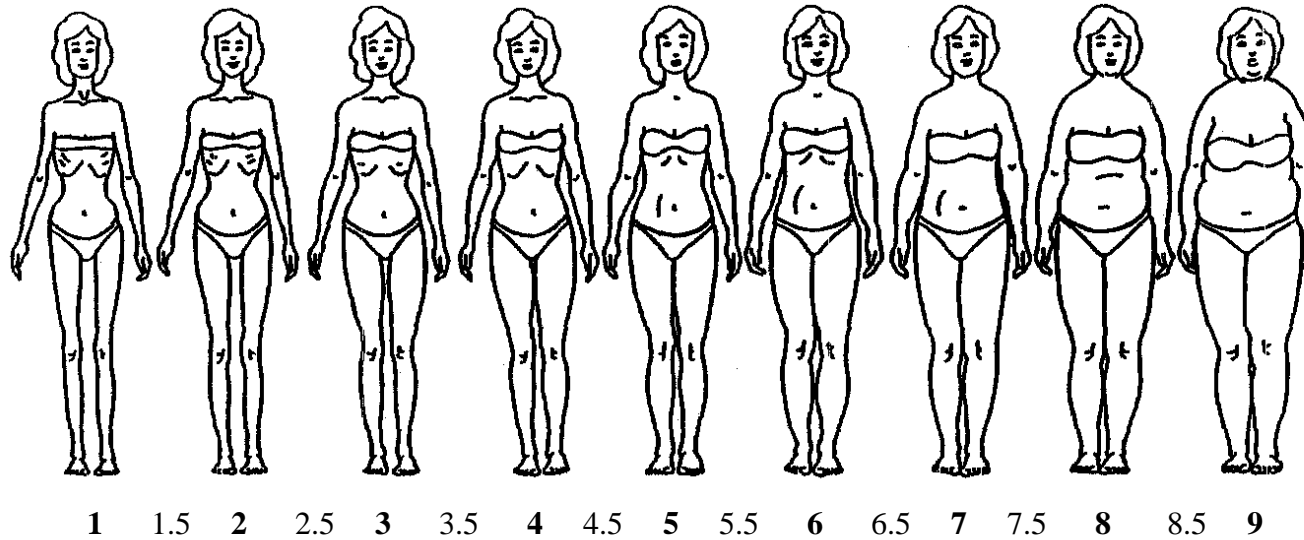
1. I consider myself a skater.	Strongly Agree								Strongly Disagree
2. I have many goals related to skating.	Strongly Agree								Strongly Disagree
3. Most of my friends are skaters.	Strongly Agree								Strongly Disagree
4. Skating is the most important part of my life.	Strongly Agree								Strongly Disagree
5. I spend more time thinking about skating than anything else.	Strongly Agree								Strongly Disagree
6. I need to participate in skating to feel good about myself.	Strongly Agree								Strongly Disagree
7. Other people see me mainly as a skater.	Strongly Agree								Strongly Disagree
8. I feel bad about myself when I do poorly in skating.	Strongly Agree								Strongly Disagree
9. Skating is the only important thing in my life.	Strongly Agree								Strongly Disagree
10. I would be very depressed if I were injured and could not compete in skating.	Strongly Agree								Strongly Disagree

Part B. Below is a list of statements dealing with your general feelings about yourself. For each item, please circle the response which best describes what you believe to be true according to the following scale.

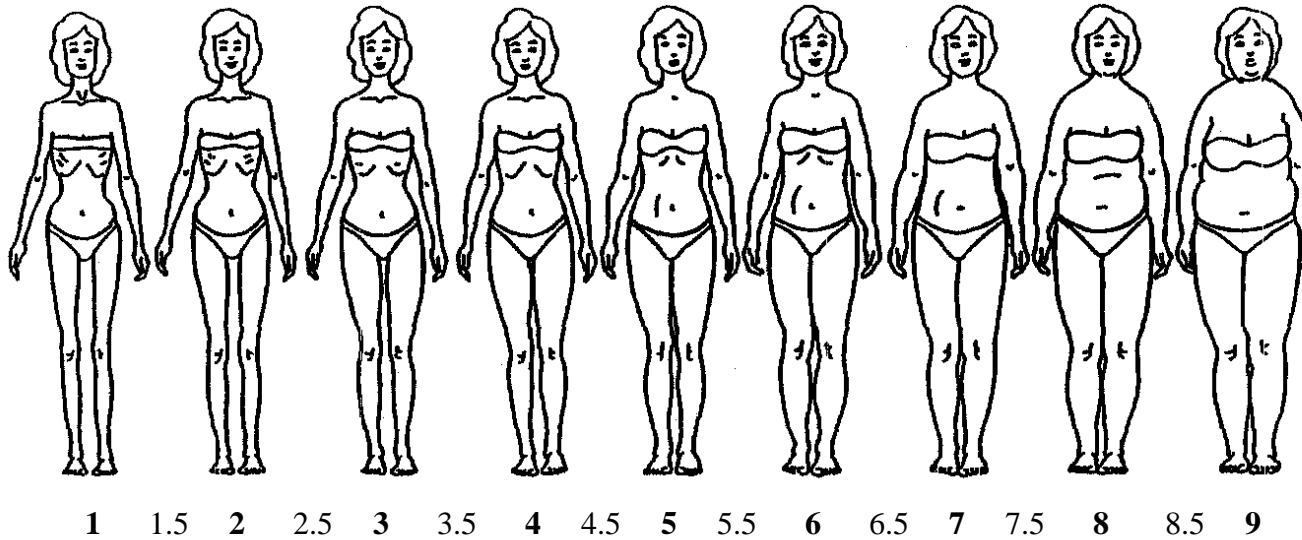
	Strongly Disagree	Disagree	Agree	Strongly Agree
1. I feel that I'm a person of worth, at least on an equal plane with others.	1	2	3	4
2. I feel that I have a number of good qualities.	1	2	3	4
3. All in all, I am inclined to feel that I am a failure.	1	2	3	4
4. I am able to do things as well as most other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

Part C.

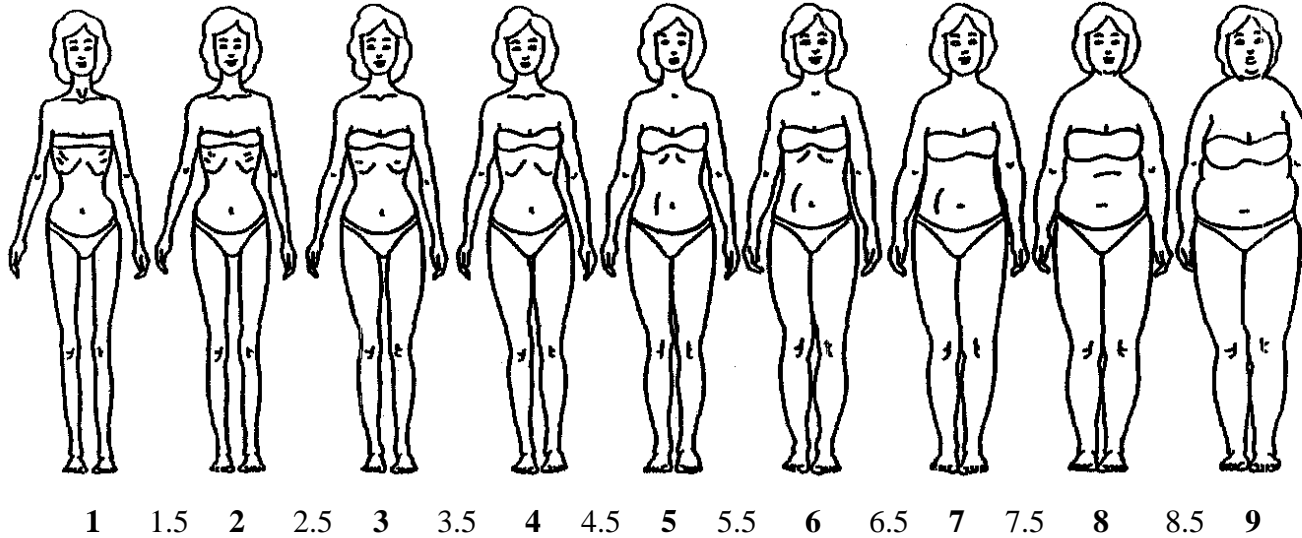
1. Select the drawing that you believe most accurately represents **your CURRENT body size** by circling the number closest to your present body size. Note: The numbers below each drawing are **not** clothing sizes.



2. Select the drawing that you believe most accurately represents **your IDEAL body size** by circling the number closest to the size you would like to be. Note: The numbers below each drawing are **not** clothing sizes.



3. Select the drawing that you believe most accurately represents the body size for the IDEAL SKATER by circling the number closest to the size you think a skater should be. Note: The numbers below each drawing are **not** clothing sizes.



Part D. Please check a response for each of the following statements. There are no right or wrong answers, so please answer honestly.

	Always	Usually	Often	Sometimes	Rarely	Never
1. I am terrified about being overweight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I avoid eating when I am hungry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I find myself preoccupied with food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I have gone on eating binges where I feel that I may not be able to stop.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I cut my food into small pieces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I am aware of the calorie content of foods that I eat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I feel that others would prefer if I ate more.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I vomit after I have eaten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I feel extremely guilty after eating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I am preoccupied with a desire to be thinner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I think about burning up calories when I exercise.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Other people think that I am too thin.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. I am preoccupied with the thought of having fat on my body.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. I take longer than others to eat my meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I avoid foods with sugar in them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I eat diet foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I feel that food controls my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I display self-control around food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I feel that others pressure me to eat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. I give too much time and thought to food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. I feel uncomfortable after eating sweets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. I engage in dieting behavior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. I like my stomach to be empty.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. I have the impulse to vomit after meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. I enjoy trying new rich foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

YOU ARE HALFWAY DONE! ☺

Part E. Please circle the number on the 6-point scale listed below that best describes how you truly feel about your current situation. There are no right or wrong answers, so please answer honestly.

	Never	Rarely	Some- times	Often	Usually	Always
1. Skaters must be a certain body weight to succeed in the sport.	1	2	3	4	5	6
2. Skating should have a weight limit.	1	2	3	4	5	6
3. My skating peers notice if I put on weight.	1	2	3	4	5	6
4. My coach encourages skaters to maintain a below average weight.	1	2	3	4	5	6
5. The lightest skaters are at a distinct performance advantage.	1	2	3	4	5	6
6. My skating attire makes me conscious of my bodily appearance.	1	2	3	4	5	6
7. The crowd scrutinizes my body and makes me concerned about my weight and appearance.	1	2	3	4	5	6
8. Body weight and appearance are important to my coach.	1	2	3	4	5	6
9. Body weight and appearance are important to my family.	1	2	3	4	5	6
10. Body weight and appearance are important to my friends outside of skating.	1	2	3	4	5	6
11. Any of my body flaws are readily apparent in my skating attire.	1	2	3	4	5	6
12. Other skaters make comments if a skater gains weight.	1	2	3	4	5	6

13. My coach notices if I gain weight.	1	2	3	4	5	6
14. My coach encourages skaters to drop pounds.	1	2	3	4	5	6
15. There are pressures associated with skating to lose weight.	1	2	3	4	5	6
16. There are pressures associated with skating to maintain a below average weight.	1	2	3	4	5	6
17. My coach places an emphasis on the weight of their skaters.	1	2	3	4	5	6
18. The leanest skaters get special treatment.	1	2	3	4	5	6
19. My skating performance would improve if I gained at least 5 pounds of muscle.	1	2	3	4	5	6
20. My coach encourages athletes to gain muscle mass.	1	2	3	4	5	6
21. My skating attire makes me aware of my build.	1	2	3	4	5	6
22. Weigh-ins are held periodically for skating.	1	2	3	4	5	6
23. My coach notices changes in my weight.	1	2	3	4	5	6
24. The leanest skaters are at a distinct performance advantage.	1	2	3	4	5	6

Part F. Read each item carefully and then check one of the following five responses.

	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
1. When I start something I feel anxious that I might fail.	5	4	3	2	1
2. My family and friends are proud of me when I do really well.	5	4	3	2	1
3. I take pride in being meticulous when doing things.	5	4	3	2	1
4. I set impossibly high standards for myself.	5	4	3	2	1
5. I try to avoid the disapproval of others at all costs.	5	4	3	2	1
6. I like the acclaim I get for an outstanding performance.	5	4	3	2	1
7. When I am doing something I cannot relax until it is perfect.	5	4	3	2	1
8. It feels as though my best is never good enough for other people.	5	4	3	2	1
9. Producing a perfect performance is a reward in its own right.	5	4	3	2	1
10. The problem of success is that I must work even harder.	5	4	3	2	1
11. If I make a mistake I feel that the whole thing is ruined.	5	4	3	2	1
12. I feel dissatisfied with myself unless I am working towards a higher standard all the time.	5	4	3	2	1
13. I know the kind of person I ought or want to be, but feel I always fall short of this.	5	4	3	2	1
14. Other people respect me for my achievements.	5	4	3	2	1

15. As a child however well I did, it never seemed good enough to please my parents.	5	4	3	2	1
16. I think everyone loves a winner.	5	4	3	2	1
17. Other people expect nothing less than perfection from me.	5	4	3	2	1
18. When I am competing against others, I am motivated by wanting to be the best.	5	4	3	2	1
19. I feel good when pushing out the limits.	5	4	3	2	1
20. When I achieve my goals I feel dissatisfied.	5	4	3	2	1
21. My high standards are admired by others.	5	4	3	2	1
22. If I fail people, I fear they will cease to respect or care for me.	5	4	3	2	1
23. I like to please other people by being successful.	5	4	3	2	1
24. I gain great approval from others by the quality of my accomplishments.	5	4	3	2	1
25. My successes spur me on to greater achievements.	5	4	3	2	1
26. I feel guilty or ashamed if I do less than perfectly.	5	4	3	2	1
27. No matter how well I do I never feel satisfied with my performance.	5	4	3	2	1
28. I believe that rigorous practice makes for perfection.	5	4	3	2	1
29. I enjoy the glory gained by my successes.	5	4	3	2	1

30. I gain deep satisfaction when I have perfected something.	5	4	3	2	1
31. I feel I have to be perfect to gain people's approval.	5	4	3	2	1
32. My parents encouraged me to excel.	5	4	3	2	1
33. I worry what others think if I make mistakes.	5	4	3	2	1
34. I get fulfillment from totally dedicating myself to a task.	5	4	3	2	1
35. I like it when others recognize that what I do requires great skill and effort to perfect.	5	4	3	2	1
36. The better I do, the better I am expected to do by others.	5	4	3	2	1
37. I enjoy working towards greater levels of precision and accuracy.	5	4	3	2	1
38. I would rather not start something than risk doing it less than perfectly.	5	4	3	2	1
39. When I do things I feel others will judge critically the standard of my work.	5	4	3	2	1
40. I like the challenge of setting very high standards for myself.	5	4	3	2	1

ALMOST THERE! ☺

Part G. Please respond to the following items as openly and honestly as possible.

1. Some believe that the sport of figure skating is linked to pressures to lose or maintain weight. Do you agree with this belief? **Circle one: Yes No**

If yes, why do you think these pressures exist?

If yes, where and/or who do you think these pressures come from?

2. In general, have your experiences in skating positively influenced the way you view your body?
Circle one: Yes No

If yes, in what ways?

3. In general, have your experiences in skating negatively influenced the way you view your body?
Circle one: Yes No

If yes, in what ways?

4. In general, have your experiences in skating *positively* influenced the way you eat and/or exercise?

Circle one: Yes No

If yes, in what ways?

5. In general, have your experiences in skating *negatively* influenced the way you eat and/or exercise?

Circle one: Yes No

If yes, in what ways?

THIS IS THE LAST SECTION! ☺

Part H. Please complete the following information about yourself as honestly as possible.

Characteristics and Background

1. Circle one: Male Female

2. Age: _____ years old

3. _____Caucasian/White _____Hispanic/Latino/Mexican American
_____African-American/Black _____American Indian
_____Asian American/Pacific Islander _____Other; Please specify:_____

4. Please complete the boxes below:

<i><u>Your Current Height</u></i>	<i><u>Your Ideal Height</u></i>	<i><u>Your Current Weight</u></i>	<i><u>Your Ideal Weight</u></i>	<i><u>Ideal Height for Skating Partner (If it applies)</u></i>	<i><u>Ideal Weight for Skating Partner (If it applies)</u></i>

5. *Females only:* Have you had your first period? (Circle one) Yes No
a. If yes, how old were you?_____ years old
b. If yes, have you missed your period in the past 3 months? (Circle one) Yes No

Skating Experience

6. How many years have you been skating? _____ years
7. Age of first competition: _____ years old
8. Circle *all levels of competition* that you have ever competed:
- a. I have never competed.
 - b. Local competition
 - c. Open event/Non-qualifying Regionals
 - d. Qualifying Regionals
 - e. Sectionals
 - f. Collegiate competition
 - g. National competition
 - h. International competition
9. For your *highest level of competition*, please specify the competition title and event (For example: U.S Junior Championships, Junior Pairs event).

Competition Title: _____

Event: _____

10. Circle your *current* skating discipline(s). If more than one, star the discipline you spend the most time in (your “focus”).
- a. Singles Skating
 - b. Pair Skating
 - c. Ice Dancing
 - d. Synchronized Skating

11. Using the table below, circle your *current competitive level* in each of the following categories. If you have never competed in a particular category, indicate your highest test passed. If you have never competed or tested in a particular category, leave that column blank.

Free Skate	Pair	Compulsory Dance	Free Dance	Synchronized Skating	Moves in the Field
Pre-preliminary	Pre-preliminary	Preliminary	Juvenile	Beginner 1-3	Pre-preliminary
Preliminary	Preliminary	Pre-Bronze	Intermediate	Preliminary	Preliminary
Pre-Juvenile	Pre-Juvenile	Bronze	Novice	Pre-Juvenile	Pre-Juvenile
Juvenile	Juvenile	Pre-Silver	Junior	Open Juvenile	Juvenile
Intermediate	Intermediate	Silver	Senior	Juvenile	Intermediate
Novice	Novice	Pre-Gold		Intermediate	Novice
Junior	Junior	Gold		Novice	Junior
Senior	Senior	International		Junior	Senior
				Senior	
				Open Collegiate	
				Collegiate	

Training

NOTE: If you are done with schooling (no longer attend school), skip question 12 and move to question 13.

12. How many hours per week do you *currently* practice skating:

a. *During the school year?* _____hours per week on-ice
_____hours per week off-ice

b. *During the summer?* _____hours per week on-ice
_____hours per week off-ice

13. How many hours per week do you *currently* practice skating:

a. *During the competitive skating season?* _____hours per week on-ice
_____hours per week off-ice

b. *During the off-season?* _____hours per week on-ice
_____hours per week off-ice
_____I don't have an off-season; I compete consistently year-round.

14. How often do you *typically* engage in exercise *outside of skating*?

- a. Never
- b. Occasionally
- b. 1 or 2 days a week
- c. 3-5 days a week
- d. 6 or 7 days a week
- e. More than once daily, 7 days a week

15. If applicable, please indicate the amount and type of exercise you perform *outside of skating*:

Type of exercise outside of skating	Hours per week	Do you perform this exercise <i>during the competitive skating season?</i> (Indicate Yes or No)
EXAMPLE: Running	3 hours per week	Yes
EXAMPLE: Volleyball practice	5 hours per week	No

Participation

16. Circle the 3 *primary reasons* why you participate in skating.

- a. To do something I'm good at
- b. To stay in shape
- c. To get exercise
- d. To lose weight
- e. To please my coaches
- f. To please my parents
- g. To make new friends
- h. To have fun
- i. To improve my skills
- j. To learn new skills
- k. For the excitement of competition
- l. For the challenge of competition

THANK YOU SO MUCH FOR YOUR PARTICIPATION! ☺

*If you have an interest in learning more about the topics addressed in these surveys,
a resource sheet is available from Dana.*

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REFERENCES

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