Female athlete body project intervention with professional ballet dancers

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Female Athlete Body Project Intervention with Professional Ballet Dancers

by

Sasha Gorrell

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Abstract

Professional dancers have increased vulnerability for eating disorders (EDs), with three times higher risk than non-dancers. Among ballet dancers, generalized risk for EDs associated with internalization of female beauty ideals (i.e., the thin-ideal) in western culture is compounded by idealization of a ballet-specific body ideal, a combination that confers unique vulnerability for eating pathology. Empirical support has been established for a healthy weight intervention (HWI) that promotes body acceptance and reducing eating pathology; the current study adapted a HWI specifically tailored to female athletes for implementation among professional ballet dancers. Participants from two elite ballet companies were randomized to a control and intervention condition. The intervention was delivered once per week over 3 weeks; all participants were assessed for eating pathology and related outcome variables pre- and post- intervention, and at 6-week follow-up. Additionally, dancers in the intervention condition were interviewed in focus groups at follow-up. Results indicated that dancers in the intervention condition demonstrated significant reductions in body dissatisfaction, dietary restraint, and eating pathology at post intervention assessment, and 6-week follow-up, as compared to control group counterparts. These results provide preliminary evidence that the current intervention may provide a feasible, acceptable, and effective means of eating disorder prevention in female professional ballet dancers. Future research should explore methods to increase participation and adoption of this program within dance companies, and ultimately, replicate this work in a larger sample.
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Chapter 1: Introduction

Female dancers report elevated eating pathology as compared to non-dancers (Arcelus, Witcomb & Mitchell, 2014) and, as a population, have unique vulnerability for development of eating disorders (Ringham et al., 2006). As aesthetic athletes, ballet dancers have specific risks for disordered eating behavior related to factors within their dance environment, including pressure to attain and maintain thinness in body shape (Thomas, Keel & Heatherton, 2005). Ballet dancers report higher levels of ‘drive for thinness’ and body dissatisfaction (BD) than non-dancers (Arcelus et al., 2014), factors that may be particularly important in contributing to the development of eating pathology (Stice & Shaw, 2002).

Weighing an average of 10-12% under their ideal body weight, ballet dancers report engaging in dieting behavior to retain this weight status (Kaufman et al., 2002). While some female dancers may restrict caloric intake motivated by a desire to lose or maintain weight, others may unintentionally consume inadequate calories, given the context of their immensely active lifestyle. Whether decreased caloric intake is concomitant with or independent of eating disorder pathology, dancers with lower energy availability are at elevated risk for injuries and/or complications related to menstrual function, decreased bone density, metabolic rate, immunity, protein synthesis, and cardiovascular health, among others (Manore, Kam & Loucks, 2007; Mountjoy et al., 2014).

1.1 Ameliorating Health Risk Within Professional Ballet

Despite this panoply of health risks, only one study of ED prevention with dancers has been implemented in ballet students (Piran, 1999), with a notable lack of interventions implemented within female dancers at the professional level. Given that BD is a salient risk factor for ED (Stice & Shaw, 2002), and may be exacerbated among elite aesthetic athletes
(Sundgot-Borgen & Torstveit, 2004), an intervention based upon improving body acceptance may mitigate risk for ED pathology in elite ballet dancers. Prior work has established that a healthy weight intervention (HWI) successfully reduced symptoms of eating disorder in collegiate female athletes (Becker, McDaniel, Bull, Powell & McIntyre, 2012). This intervention was based on investigations suggesting that encouraging healthy lifestyle choices, and pursuit of a healthy ideal body shape helped females to improve body acceptance, effects which were maintained over time (Stice, Marti, Spoor, Presnell & Shaw, 2008). In sum, efforts to extend prior success of a HWI with female athletes to an intervention with professional ballet dancers (i.e., elite aesthetic athletes) may demonstrate improvements in health-oriented behavior, as well as reductions in BD, and ED pathology.

1.2 Aims & Hypotheses

The current study implemented an adaptation of a HWI that is specifically modified for female athletes (AM-HWI; for more information on the original study, see Becker et al., 2012); the intervention was further modified to be appropriately implemented in a population of female professional ballet dancers. Study aims were three fold. First, within a population of female professional ballet dancers, the current study assessed the effectiveness of an adapted AM-HWI in reducing body image dissatisfaction, and ED symptoms. Second, in addressing these measures over time, this study aimed to evaluate if intervention effects might be sustained at a 6-week follow-up assessment. Lastly, as an exploratory aim, qualitative data was collected in focus group interviews in an effort to assess the acceptability and feasibility of this intervention within a sample of elite, professional ballerinas.

In an effort to replicate and extend prior work (Becker et al., 2012), primary dependent variables reflected measures used in previous trials. Assessments included changes in a global
symptom ED measure, negative affect, thin-ideal internalization, dietary restraint, shape concern, and weight concern. As domains that were specifically targeted in the intervention, BD, and ED pathology were outcome variables of primary interest in the current study. It was hypothesized that, in comparison to the control group, dancers who were randomized to the intervention group would report greater change in eating pathology, as well as reduction in BD at the conclusion of the intervention; it was expected that the decreasing linear trend would be retained at the 6-week follow-up assessment. Such a trend would suggest that targeted domains within this intervention (i.e., encouraging healthy lifestyle choices, and pursuit of a healthy ideal body shape) would help females to improve body acceptance, as well as to decrease overall reported eating pathology.
Chapter 2: Literature Review

2.1 Eating Disorders in Female Athletes

By nature of the physical demands of the profession, ballet dancers are elite athletes, and as such, are vulnerable for the same health risks (including ED pathology) as other female athletes. While evidence for increased prevalence of EDs in female athletes is somewhat equivocal (e.g., Sanford-Martens, Davidson, Yakushko, Martens & Hinton, 2005), some work has indicated that participation in sport may increase risk for female athletes to develop sub-clinical and clinical eating pathology as compared to non-athletes (Sundgot-Borgen & Torstveit, 2004). In one study, assessment of eating behavior revealed that overall, few female collegiate athletes endorsed binge eating. In regards to other reported eating behaviors, many athletes endorsed controlling their weight via exercise, rather than by vomiting, or use of laxatives or diuretics (Greenleaf, Petrie, Carter & Reel, 2009). Another study of college students found that female athletes did not endorse more ED pathology than non-athletes; however, among athletes, those who participated in leanness-dependent sports reported elevated ED symptoms as compared to non-leanness sport counterparts (Reinking & Alexander, 2005). Specifically, prevalence rates for ED appear to be consistently higher for female athletes in aesthetic or judged sports (e.g., figure skating, diving, gymnastics) and those sports where leanness is believed to enhance endurance and performance (e.g., distance running) (Bratland-Sanda & Sundgot-Borgen, 2013; Schaal et al., 2011; Sundgot-Borgen & Torstveit, 2004).

A meta-analysis of thirty-four studies involving the relationship between athletic participation and eating pathology suggested that sport participation might serve as a protective factor for some athletes, whereas it might constitute a risk factor for others (Smolak, Murnen & Ruble, 2000). These findings suggest that it is not athletic participation itself that creates the risk
for the athlete but rather, factors unique to a certain sport or athletic environment. For example, athletes in weight-sensitive sports appear to be most at risk for eating pathology (Brownell & Rodin, 1992; Smolak et al., 2000; Sundgot-Borgen et al., 2013). Weight-sensitive sports are grouped into three categories: (1) Gravitational sports, (e.g., long-distance running, cross-country skiing, cycling, ski and other types of jumping) (2) Weight-class sports (e.g., wrestling, boxing, weight lifting, and rowing) and (3) Aesthetically judged sports (e.g., rhythmic and artistic gymnastics, figure skating, diving and synchronized swimming) (Ackland et al., 2012). In each of these categories, risk for elevated EDs may be accounted for by sport-specific motivation, such as a desire to enhance performance by obtaining a certain weight or shape (Sundgot-Borgen & Torstveit, 2004). For athletes in certain sports, performance may be only permitted when a certain weight class has been achieved (e.g., light-weight rowing; wrestling). For sports where leanness is emphasized (e.g., distance running), an athlete who presents a thin or lean body shape and low body weight may be expected to have enhanced performance (Legaz & Eston, 2005; Martinsen, Bratland-Sanda, Eriksson, & Sundgot-Borgen, 2010). More accurately, weight loss in some athletes will sometimes improve performance (only to certain degrees of leanness and only temporarily) but weight loss in other athletes will cause performance deficits (Powers & Thompson, 2007).

Brownell (1992) commented on two prevailing assumptions within a modern conception of weight and shape. The first assumption is that our body is infinitely able to change to reach an ideal, with only the right combination of exercise and diet. And the second assumption, that vast rewards await he/she who attains this ideal. Each of these assumptions ignores the limitations conferred upon our physical evolution by our genetic composition, and may spur unrealistic aspirations to physical ideals. As such, the prevailing notion in the athletic environment that
thinness or leanness can enhance athletic performance (Wilmore, 1992) is not only errant, but may also serve to initiate and maintain eating pathology.

Risk for maladaptive outcomes may also differ according to an athlete’s competition level, with greater prevalence of ED among elite athletes (Byrne & McLean, 2002; Smolak et al., 2000). Some specific contributing factors to this risk include the pressure to lose weight from coaches, and an escalation in training (resulting in low energy availability) that may originate and precipitate ED development (Sundgot-Borgen, 1994).

2.2 Eating Disorders in Dancers

Factors that lead to increased vulnerability of ED among athletes (e.g., elite status and/or context-specific aesthetic body ideals) may also lead to elevated risk for dancers, as compared to non-dancers. Recent comprehensive meta-analysis of literature on dancers and ED identified that general dancers (i.e., participants in varied dance forms including tap, modern or jazz) had more than twice the risk of developing an ED and more than three times the risk of developing anorexia nervosa (AN) and eating disorder not otherwise specified (EDNOS) than non-dancers (Arcelus et al., 2014). To date, no work has directly compared general dancers with ballet dancers specifically, but Arcelus and colleagues (2014) found that across studies included in meta-analyses, ballet dancers demonstrated elevated scores on the Eating Disorder Inventory, as compared with general dancers and presented with higher levels of drive for thinness, bulimia, and BD. Future research is needed to determine if these findings derive from pre-disposing factors (e.g., perfectionistic temperament; Thomas et al., 2005) that may lead a dancer to choose to specialize in ballet. As well, future work might identify whether there are risk factors specific to ballet (e.g., emphasis on conformity in size and shape; Pickard, 2012) that differentially confer risk for ballet dancers, and are less present for participants in other dance forms.
While dance is qualitatively considered an art form, members of elite ballet companies must maintain a lean body weight, and level of physical fitness akin to that of an elite athlete. While ballet is not ‘judged’ per se, artistic and casting directors consistently evaluate dancers for suitability for certain roles, training programs, and employment contracts. Overall, if it were considered in the context of weight-sensitive athletics (defined above; Ackland et al., 2012), ballet may be considered ‘aesthetic judged,’ akin to figure skating or gymnastics. As such, ballet dancers are presumed to be at higher risk for ED (Herbrich, Pfeiffer, Lehmkuhl & Schneider, 2011).

More than half of the studies in the Arcelus and colleagues (2014) meta-analyses used the Eating Attitudes Test (26 or 40 items), a measure that is not able to determine a diagnosis of ED. However, findings across the literature consistently indicate that dancers tend to score higher on measures of eating disturbance and BD than non-dancers (Abraham, 1996; Ackard, Henderson & Wonderlich, 2004; Arcelus et al., 2014; Holderness, Brooks-Gunn & Warren, 1994; Neumarker, Bettle, Bettle, Dudeck & Neumarker, 1998; Neumarker, Bettle, Neumarker & Bettle, 2000; Ravaldi et al., 2006). Two studies that notably found contrasting results did not determine that dancers had a higher rate of ED than age matched females in the general population (Robbeson, Kruger & Wright, 2015; Toro, Guerrero, Sentis, Castro & Puertolas, 2009). The disparity in findings may reflect the population of the study sample (adolescent dance students), as even non-dancing college-aged females may be more vulnerable to disordered eating, due to developmental factors (Tylka & Hill, 2004).

The majority of investigation of dancers and ED has examined dance students and pre-professionals (e.g., Neumarker et al., 2000; Robbeson et al., 2015; Thomas et al., 2005), which limits the conclusions that can be drawn about the prevalence and risk factors for ED in
professional dancers (Arcelus et al., 2014). Some of the limited existing literature exclusively addressing professional dancers has identified that prevalence rates of ED in this population are significantly elevated (Arcelus et al., 2014; Ringham et al., 2006). Within recent meta-analyses conducted by Arcelus et al. (2014), three studies that specifically studied professional ballet dancers measured lifetime prevalence of EDs and found a range from 15.78% to 82.6% (Holderness et al., 1994; Nascimento & Fontenelle, 2012; Ringham et al., 2006). The expansive range may be partially explained by the number of EDNOS cases (55%) found in the investigation conducted by Ringham et al., (2006). In this study, 83% of dancers met lifetime criteria for AN (6.9%), AN + BN (10.3%), BN (10.3 %), and EDNOS (55%). Within this study, female dancers were found to frequently engage in binge eating and purging behaviors, with pathology as severe as that of non-dancing women with EDs. These prevalence rates among dancers are substantially elevated as compared to national population ED averages for females, which are approximately .9% for AN and 1.5 % for BN (Hudson, Hiripi, Pope & Kessler, 2007). In line with studies of dance students (e.g., Thomas et al., 2005), examination of professional dancers and ED generally aligns with a presentation of AN (Nascimento, Luna & Fontenelle, 2012). As such, many female ballet dancers may be consuming inadequate nutrition to meet the needs of their physically demanding profession.

2.3 Physiological Risk Factors: Female Athlete Triad

Regardless of their weight loss intentions, women who engage in very high levels of daily activity, including dancers, may be at risk for consuming inadequate calories for their activity level - such that a negative energy balance is established. Notably, negative energy balance may occur concomitantly or independently of disordered eating. This low energy availability is associated with cessation of regular menses; in turn, this pattern is associated with
decreased bone mineral density. The combination of these three factors places the athlete (or dancer) at greater risk for injury (e.g., stress fractures), as well as incurs increased risk for developing long-term health consequences such as osteoporosis (De Souza & Williams, 2004). Investigation specifically of female collegiate athletes has identified these women as at greater risk for ED than their non-athletic peers (Hinton & Kubas, 2005), and at unique risk for developing the Female Athlete Triad (i.e., low energy availability, amenorrhea, and decreased bone density) and subsequent injury (Barrack et al., 2014).

In contrast to what is often assumed, a menstrual disorder is not directly caused by low weight/low body fat, nor is disruption in a normative menstrual cycle an indicator of training at an appropriate intensity. Furthermore, a common misperception exists, that ED symptoms such as amenorrhea and excessive exercise are “normal” or even desirable (Trattner Sherman, Thompson, Dehass & Wilfert, 2005). Instead, there is evidence that restriction of caloric intake (whether intentionally, or not) – and ultimately low energy availability - causes a disruption of hormones needed for regular menses (Warren & Perlroth, 2001).

More recent findings suggest there may be a fourth component of risk associated with low energy availability for athletes: increased risk for early development of cardiovascular disease (De Souza & Williams, 2004). The term Relative Energy Deficiency in Sport (RED-S), was proposed by the 2005 International Olympic Committee Consensus Statement on the Female Athlete Triad, and expands the definition of the Triad to include cardiovascular risks (i.e., thereby including male athletes as well) (Mountjoy et al., 2014). Recent study of male and female team sport athletes found that approximately two thirds of the athletes were dieting during their season; those who were endorsing dieting had lowered energy availability and increased report of ED pathology (Wright, Ford & Botha, 2014). The syndrome of RED-S
encompasses symptoms including, but not limited to, metabolic rate, menstrual function, bone health, immunity, protein synthesis, and cardiovascular health – all directly resulting from relative energy deficiency. Therefore, a more current conceptualization of the Female Athlete Triad encompasses a broader clinical syndrome that affects many aspects of physiological health, and athletic performance.

The first study to examine the Female Athlete Triad in professional ballet dancers was too small to make multiple comparisons (N = 22), but did identify that only 14% of the sample did not display any of the Triad components (Hoch et al., 2011). Furthermore, in this sample, 86% of participants reported ‘disordered eating’ which was characterized by the study authors as a combined category of low energy availability and/or abnormal scores on the Eating Disorders Examination-Questionnaire. Overall, study of menstrual disorders specifically in professional dancers is limited but one recent investigation found that amenorrhea was significantly correlated with scores on measures of eating pathology (i.e., scores on the Brief Eating Disorder in Athletes-Questionnaire). Interestingly, while this sample was small (N = 21), nearly two thirds of participants also endorsed consumption of nutritional supplements; the authors speculated that the use of supplements within this particular sample may have been intended to offset what the dancers lack from other dietary intake (Peric, Zenic, Sekulic, Kondric & Zaletel, 2016).

Biological health problems associated with low energy availability (e.g., bone health) are arguably extremely impactful on the quality and longevity of a dancer’s career. However, these factors are often placed as secondary to other issues more endemic to the psychological stress of the profession as a whole that contribute to a larger collection of occupational health risks, including ED pathology (Peric et al., 2016).

2.4 Psychological Risk Factors
2.4.1 Psychological Risk Factors Specific to the Profession

Ballet dancers experience certain characteristics specific to their craft that may serve to increase psychological risk for ED pathology. Most of these risk factors for ballet dancers are exclusive to females. For one, traditional choreography within ballet (as opposed to choreography in other, more contemporary dance forms) requires that the female dancer engage in partnering sequences where she will be lifted and manipulated by her male partner. Within this traditional choreographic structure, it is not only preferred, but also an aesthetic requirement, that the female be of a weight where she can be easily lifted (Koutedakis & Jamurtas, 2004).

Furthermore, ballet dancers are part of an aesthetic tradition whereby the expectations of the female dancer’s body follow certain parameters. These features include long, lean limbs and a feminine – yet waiflike – appearance (Pickard, 2012). Those dancers who are not genetically predisposed to have this lean form will be influenced to try to achieve this physique by pressure within the ballet environment (Thomas et al., 2005). This pressure may be implied within more subtle communication (i.e., comments from peers or supervisors), but also overtly communicated through casting decisions for certain dance roles or promotion in rank. In sum, the belief that a smaller body will achieve greater performance and accolades may lead some female dancers to be more likely to engage in eating and exercise behaviors to help them aspire to this aesthetic (Pickard, 2012).

Elite dancers exercise at an elevated intensity, with very little rest within any given, typical nine-hour workday (Twitchett, Angioi, Koutedakis & Wyon, 2010); this time is spent in front of mirrors in tight fitting attire that resembles a bathing suit. This is not only traditional garb based on a cultural aesthetic, but is also a practical necessity given the freedom of movement and partnering required to complete most choreography. While this attire is
customary, the National Collegiate Athletic Association found that increased preoccupation with weight and shape can result from wearing revealing uniforms (National Collegiate Athletic Association 2005); by extension, the same might be said for professional ballerinas. Increases in body-surveillance may be a natural consequence of wearing more revealing, or tight attire; recent work in a non-clinical sample found that experimentally induced body checking led to increases in fear of uncontrollable weight gain (Baily & Waller, 2017). Other negative consequences linked with body surveillance may be a result of associations between wearing tight attire and elevated self-objectification (Prichard & Tiggemann, 2005). Dancers may not necessary choose to wear tight attire if not already expected as part of the profession; as such, some may feel self-conscious in the limited clothing they wear. As such, some researchers have speculated that revealing attire further increases the likelihood of competitive thinness by facilitating unhealthy body comparisons (Powers & Thompson, 2007).

2.4.2 Body Dissatisfaction

Etiological models of EDs identify body dissatisfaction (BD) as an important risk factor for the development of eating pathology. Specifically, there is evidence that internalization of a “thin-ideal” and perceived pressure to be thin increase vulnerability for subsequent elevated BD (Stice & Shaw, 2002). The role that body image plays in ED risk in athletes is not clearly defined within the literature. On the one hand, body image disturbance appears to contribute to eating pathology in athletes (Berry & Howe, 2000; Byrne & McLean, 2002). On the other hand, some work has found improved body image in athletes (Hausenblas & Downs, 2001) which supports the perspective that disturbed body image may or may not be part of ED presentation in all athletes. To better understand this disparity, recent investigation compared general and athletic BD and reported ED pathology among 320 elite, recreational, and noncompetitive female
athletes (aged 17 – 30) participating in leanness focused sports and non-leanness focused sports. Results indicated that athletes from leanness focused sports reported higher levels of BD and greater disordered eating symptomatology, regardless of athletic participation level. Elite athletes reported higher levels of BD and greater ED pathology regardless of sport type; differences between recreational and noncompetitive athletes were not found (Kong & Harris, 2015). These findings suggest that female gender, weight sensitive activities, and elite level of participation may form a unique interaction of precipitants for BD, and subsequent risk for ED.

Any precipitants of BD (e.g., internalization of a thin ideal) may be particularly salient for dancers whose risk for ED may emanate from pressures for thinness within the ballet environment (Thomas et al., 2005). The shape of ballet dancers’ bodies has changed throughout history, but the current modern aesthetic of a ballet dancer follows the trend of long, lean limbs, and minimal curves (Pickard, 2012). Qualitative research confirms the substantiated belief that pubertal changes can make or break the emerging career of a young dancer (Mitchell, Haase, Malina & Cumming, 2016). Longitudinal investigation of adolescent ballet students determined that scores on ‘drive for thinness’ and ‘body dissatisfaction’ scales of the Eating Disorder Inventory were the only factors that predicted development of ED at follow-up (2-4 years after initial assessment) (Garner, Garfinkel, Rockert & Olmstead, 1987). These findings indicate that body image disturbance with vulnerable ballet student adolescents may be identified early, to offset later eating pathology.

In an effort to understand the mechanism by which BD may impact ED in certain populations, some work has applied tenets of Objectification Theory to the study of eating disorders in dancers and athletes (Slate & Tiggerman, 2011). Repeated experience of being treated as an object that is looked at and evaluated gradually leads an individual to internalize an
observer’s perspective of his or her own body (Fredrickson & Roberts, 1997). This ‘self-objectification’ may increase self-consciousness, encourage habitual monitoring of appearance, and has been theorized to contribute to elevated levels of body shame and appearance anxiety, and EDs (Pickard, 2012; Slate & Tiggerman, 2011). Within the dance sub-culture, there are at least two ways of viewing self-objectification. First, we might presume that individuals who naturally have this capacity, or score higher on this construct might be more interested in, and therefore self-select into the world of dance. After all, the daily routine of every dancer consists of classes and rehearsals within a studio with mirrors, making any avoidance of self-reflection nearly impossible, and intense self-scrutiny outright encouraged. Second, we might instead presume that, regardless of predisposing tendency to naturally align with self-objectification, the world of dance is an environment where this construct is exacerbated. Dancers consistently perform as objects to be viewed, are routinely filmed, and photographed. Even for non-professional dancers, the effect of studio mirror exposure during training has been implicated in leading to decreases in body satisfaction (Radell, Adame & Cole, 2002). Whether self-objectification was the motivator to begin the pursuit of dance or simply an effect of exposure, the end result may be lasting, as a study of former dancers demonstrated that these individuals scored more highly on self-objectification, self-surveillance, and disordered eating than age-matched, non-dancers (Tiggerman & Slater, 2001).

Study of adult dancers at all levels of participation (elite, college, and recreational) has consistently found higher levels of BD in dancers, as compared to non-dancers (Ackard et al., 2004; Ravaldi et al., 2003). In large part, this may be due to the complexity of a dancer’s body ideal, as it may include facets of a general thin ideal, as well as to a thin ideal that is specific to the dance world. Qualities of the general thin ideal that may appeal to a dancer include a desire
for a slender, toned body with long, lean limbs (Thompson & Stice, 2001). However, rather than retaining feminine curves popularized in the media as part of a general thin ideal (Thompson & Stice, 2001), a dancer may still covet a feminine quality, but one that is waiflike, rather than curvaceous (Pickard, 2012). Indeed, research has found that body image is multifaceted, and a dynamic and reactive concept rather than a stable and consistent trait (Tiggemann & Slater, 2001).

The formation of body image may be even more salient for dancers who are experiencing a physical ideal that may depend deeply on context (De Bruin, Oudejans, Bakker & Woertman, 2011). The social world of ballet depends upon uniformity in body shape and size, as the technique of ballet is designed to have precision in placement, body lines, and visual aesthetic (Pickard, 2012). In such a context, being thin is thus not only the norm, but the expectation. It is context that has led one extensive meta-analysis to determine that in athletes, a high drive for thinness was not accompanied by high BD (Smolak, Murnen, & Ruble, 2000). Instead, depending on the specific pressures of a given sport, body image may be much more nuanced. For example, rather than believing that ‘thin is beautiful,’ gymnasts appeared to believe that their coaches placed pressure on weight loss motivated by the belief that ‘thin is going to win’ (De Bruin et al., 2007). These results suggest that whether it is to please a superior (e.g., coach or ballet instructor), or to maximize competitive edge, the relation between body image and ED may carry specific moderating motives. Particularly for female athletes, body image is not a stable construct and varies between their athletic lives and daily lives (De Bruin, 2010). For example, for a young female professional dancer who is an emerging adult, watching a television program with non-dancer friends, she may adopt a general cultural ideal. Whereas in contrast, the next day when she might be in a ballet class or rehearsal, this young woman may adopt a
different (e.g., leaner, and less curvaceous), dance-specific ideal. In this example, each physical ideal is individually very difficult to attain, and taken together, generally present an implausible aim for this young woman.

2.4.3 Psychological Risk Factors Specific to Training

In addition to vulnerability associated with BD, risks specific to employment in dance may begin at the level of training. Young women in competitive dance training, including professional or semi-professional ballet schools, and college dance programs, appear to experience elevated levels of ED pathology, and specifically to endorse symptoms in line with AN (Abraham, 1996; Garner & Garfinkel, 1980; Garner, Garfinkel, Rockert, & Olmsted, 1987; Hamilton, Brooks-Gunn, & Warren, 1985; Ravaldi et al., 2003; Szmukler, Eisler, Gillies, & Hayward, 1985).

An investigation of adults who reported having had childhood dance training indicated that women who participated in childhood dance are more likely to score higher on measures of bulimic behaviors than non-dancers. These women who were childhood dancers also indicated greater drive for thinness, poorer impulse control, greater perfectionism and smaller ideal body mass than non-dancers (Ackard et al., 2004). Examining the mechanism behind the link between training and later pathology, one study of college dancers investigated certain aspects of the training environment itself that may pose negative consequences. The authors found that reports of learning experiences concerning thinness during dance training predicted adult disordered eating, and thinness expectancies mediated the relationship between learning about thinness and adult eating disturbance (Annus & Smith, 2009). The authors described learning about thinness as including such experiences as comments from the instructor about the importance of thinness, weighing of dancers, or modeling of dieting or other weight control behaviors from classmates.
In line with previous research identifying that higher level of participation in dance is related to greater eating pathology (Garner & Garfinkel, 1980; Hamilton et al., 1985; Smolak et al., 2000; Thomas et al., 2005) the authors also found that women in higher-level dance classes reported experiencing more thinness-related learning in those dance classes than women in lower level dance classes (Annus & Smith, 2009). While these findings suggest an interesting explanation for how learning experiences and thinness expectancies in dance training may lead to later ED risk, this study may be limited by its reliance on adult retrospective self-report. Furthermore, it is unclear whether increased risk for ED may be a result of the training itself, or may reflect the tendency for individuals already at risk for ED to self-select into this particular art form.

2.4.4 Psychological Risk Factors Specific to Individual Personality Traits

Perhaps particularly for those who self-select into the art form, the very qualities that make dancers such capable and elite athletes may also facilitate their ability to achieve success in extreme weight control (Brownell & Rodin, 1992). Commitment to their training, mental toughness, pursuit of excellence, and performance despite pain are all qualities in athletes (and dancers) that are akin to the asceticism, excessive exercise, and denial of discomfort identified in individuals with EDs (Thompson & Sherman, 2011).

Among studies of dance students, perfectionism has consistently been identified as elevated compared to non-dancer peers (Anshel, 2004), and correlated with increased incidence of negative psychological outcomes (e.g., negative affect and social physique anxiety; Cumming & Duda, 2012) as well as ED (Penniment & Egan, 2012; Ringham et al., 2006; Thomas et al., 2005). Recent investigation of adult dancers has also identified perfectionism as an important predisposing factor for elevated eating pathology (Penniment & Egan, 2012; Ringham et al., 2006). One recent study investigated perfectionism in a more nuanced manner and found a
greater influence of self-evaluative perfectionism (i.e., includes concern over mistakes; need for approval), rather than conscientious perfectionism (i.e., includes striving for excellence; high standards for others), on eating psychopathology in dancers (Goodwin, Arcelus, Geach & Meyer, 2014).

Investigation of adolescent female dancers (aged 13-17) found significantly lower values of both self-esteem and body satisfaction than age-matched controls (Bettle et al., 2001). Other investigation of dancers has also identified strong associations between lowered self-esteem and ED pathology (Benn & Walters, 2001). Some work in dance students found that those with greater perfectionistic tendencies experienced more cognitive and somatic anxiety, and lower self-confidence than other dancers (Nordin-Bates, Cumming, Aways & Sharp, 2011). One recent study identified that negative affect (anxiety and depression) partially mediated the relation between environmental weight pressure and ED risk. This study also identified that certain psychological factors including coping with adversity, freedom from worry, and self-confidence as protective skills against risk for eating disorders among dancers (Estanol, Shepherd & MacDonald, 2013). Further research might work to identify personality traits that are both specific risk factors, as well as protective factors that may be associated with increased ED pathology in professional dancers. Once identified, these factors may be integrated into clinical screening and interventions.

2.5 Interventions to Prevent ED

2.5.1 Interventions with Athletes

Despite a clear need, few successful interventions to prevent ED have been able to produce effects that have replicated across labs (Stice, Presnell, Gau & Shaw, 2007). Furthermore, even fewer interventions have been explicitly conducted in athlete populations.
One of the notable few, entitled ATHENA (Athletes Targeting Healthy Exercise and Nutrition Alternatives), studied 928 young female high school athletes in 40 sport teams at 18 schools. The intervention required participants to attend 8 weekly 45-minute sessions. Results indicated that athletes who participated in the program reported less use of diet pills and athletic-enhancing substances, improved strength-training self-efficacy, and healthy eating behaviors (Elliot et al., 2004). However, follow-up assessment one to three years later showed reductions in marijuana and alcohol use, but no reduction in eating pathology (Elliot et al., 2008).

Two notable evidence-based intervention programs have produced replicable effects in reduction of ED symptoms, with demonstrated longitudinal success (Stice, Rohde, Butryn, Shaw & Marti, 2015). One of these interventions is a dissonance-based program (DBP), in which participants are encouraged to critique the “thin-ideal,” thereby producing cognitive dissonance that causes a reduction in thin-ideal internalization. In turn, this dissonance reduces BD, negative affect, and ED symptoms ((Becker, Smith, & Ciao, 2006; Matusek, Wendt, & Wiseman, 2004; Stice, Chase, Stormer & Appel, 2001; Stice, Mazotti, Weibel, & Agras, 2000; Stice, Trost & Chase, 2003). The second intervention to produce replicable effects is a healthy weight intervention (HWI), which was developed by Stice and colleagues (2001) initially as a placebo control group against which to compare to DBP. When the HWI produced positive effects, however, researchers began studying it as a program in its own right (Stewart et al., 2014). In the HWI, participants evaluate eating and exercise habits via self-monitoring and then commit to small, manageable changes to diet and exercise. Independent trials have found that this intervention empowers individuals to manage their weight for their body type, and produces reductions in BD, dieting, negative affect, and ED pathology in at-risk females (Becker et al., 2012; Matusek et al., 2004; Stewart et al., 2014; Stice et al., 2003).
Despite the evidence of the benefits of DBP and HWI in the general population, in one small study (N = 29) that implemented both DBP and HWI specifically in a population of athletes, no reduction in ED pathology was indicated for either intervention (Smith & Petrie, 2008). This study may have been limited by its small sample size, and perhaps by the minimal tailoring that the authors did to the programs to make them suitable for use in an athlete population (Becker et al., 2012). Another larger comparative examination included extensive modifications to both programs, in a study of 168 collegiate female athletes (Becker et al., 2012).

In a DBP modified for athletes (AM-DBP), additions to the original DBP manual included education on the Female Athlete Triad as well as discussion of body image pressures placed on athletes, including description of the traditional thin ideal versus an athlete-specific thin ideal. The athlete-specific modified version of the healthy weight intervention (AM-HWI) was based on the HWI manual developed by Stice and colleagues (2007). Similar to the AM-DBP, the intervention included education on the Female Athlete Triad and a discussion surrounding discrepancies in body image related to an athlete-specific thin ideal versus an athlete-specific healthy-ideal. Athletes were asked to consider their approach to training (e.g., avoiding over exercise), and changes to behavior that may need to occur, relative to being in season or off-season. Other modifications included a peer-leadership component, and an additional focus on increasing nutritional density, and adjusting other performance-enhancing variables such as managing sleep (which can also influence weight) (Becker et al., 2010). Results indicated that both the AM-DBP and AM-HWI reduced all dependent variables (negative affect, thin-ideal internalization, dietary restraint, shape concern, weight concern and bulimic pathology) at six weeks, and effects remained at 1-year follow-up for negative affect, bulimic pathology, and shape concern. Qualitative reports indicated a fairly high level of consensus of preference.
among the female athletes for AM-HWI. Specifically, a nutrition-oriented intervention intuitively made sense to the athletes, as it could help performance and health, as opposed to a program that appeared to be more body image focused (Becker et al., 2012).

One study examined potential moderators and predictors of an AM-DBP vs. AM-HWI intervention response, including type of sport, and pre-existing levels of ED pathology (Stewart, Plasencia, Han, Jackson & Becker, 2014). Results indicated that athletes in non-lean sports in the AM-DBP intervention showed greater improvement in negative affect versus non-lean sport athletes in the AM-HWI. Higher baseline scores of bulimic pathology predicted improved response in bulimic pathology to both programs at 6-weeks. In contrast, athletes with higher negative affect and dietary restraint at baseline indicated poorer response to both interventions at 6-weeks. Athletes with higher baseline shape concern showed decreased responding to the AM-HWI at post-intervention assessment. Overall, results suggest that in female athletes, moderating factors such as negative affect, body concern and dietary restraint may negatively influence response to ED intervention, which may also be evidenced in female ballet dancers.

2.5.2 Interventions with Dancers

Eating disorder prevention in dancers has rarely been formally conducted, at any age or dance participation level. The only study implemented and published, one program was designed for the prevention of EDs in an elite, residential ballet school for female and male students (aged 10–18) in Canada (Piran, 1999). Employing small focus groups of students, the program was designed to reduce preoccupation with weight and shape, and to increase acceptability of diverse body shapes. Within the school, both teachers and students alike were encouraged to place emphasis on body conditioning strength and stamina, rather than simply a desire to be thin. Overall, the intervention targeted any factors within the school environment
that might undermine a more positive or adaptive self-image (e.g., negative comments regarding size or shape). This intervention found significant reductions in disordered eating patterns (e.g., decreased vomiting, restriction, and laxative use) and disturbed attitudes about eating and body shape, as well as significant increases in healthy eating patterns (Piran, 1999). Such evidence is encouraging as an indicator that interventions in key target areas might be successful within a high-risk environment such as ballet. Furthermore, these findings indicate that an approach that highlights acceptance of diverse body shapes, and an emphasis on health (rather than thinness) might be an effective means of intervention within the high-risk, specialized dance environment.

A cultural shift in a specific milieu is a consequence of, and dependent upon change within all levels of a given system; while systemic change can begin at a certain level, comprehensive shifts within a culture require movement at all levels. Prior work with athlete populations has cited the importance of having buy-in from not only the athletes themselves, but also in having support and stakeholder agreement from coaches and athletic departments etc. (Becker et al., 2012). Piran (1999) implemented the study described within both students and staff, which may have been a key aspect in effecting positive change. As such, while the current study attempted to effect change within the dance environment at the level of the dancers, future work may require involvement of dance company directors or other members of staff (e.g., ballet masters).

**2.6 Summary**

To date, despite a panoply of identified physiological and psychological health risks, an intervention program for the prevention of ED has not been tested in a professional ballet population. Prior evidence has indicated that for athletes, an intervention with emphasis on factors that may enhance performance other than body shape or weight (e.g., improving sleep,
nutrition) may be acceptable and even preferred to other presentations of similar interventions (Becker et al., 2012). Furthermore, the specific elements included in the AM-HWI program (i.e., education about the Female Athlete Triad; encouraging participants to embrace an athlete-specific healthy ideal rather than a thin ideal) may directly target and offset the extreme emphasis on a thin ideal that is typically coveted within the ballet environment. The current study adapted an AM-HWI that has been tested amongst female elite college athletes (Becker et al., 2012) with modifications designed to increase acceptability within a sample of ballet dancers. This intervention was specifically designed to target and mitigate BD, thin ideal internalization, dietary restraint, and global eating pathology in a population of elite female ballerinas.
Chapter 3: Method

3.1 Participants

The current study recruited from two elite dance companies on the United States east coast. With inclusion criteria of female gender, and a minimum of 18 years of age, there were approximately 52 women who were eligible from American Ballet Theatre (ABT), and 36 from Boston Ballet (BB). Of the 88 total eligible, 6 consented (12% of those eligible) from ABT and 13 (36% of those eligible) consented from BB. Each company is ranked nationally and internationally as elite by the size of their operating budget and number of employees (approximate 2015 budget of $43 million/90 dancers (ABT); $34 million/60 dancers (BB)). Across both companies, the dancers ranged in age from 18–34 [$M (SD) = 23.21 (5.75)$] and had been professionally employed for a range of < 1 – 16 years [$M (SD) = 5.26 (5.46)$]. In the combined sample of both companies, participants self-identified as White (15; 79%), White/Asian (2; 10.5%), and Native Hawaiian or other Pacific Islander (2; 10.5%). Self-reported height and weight data were used to calculate body mass index (BMI). For a slight majority of dancers, BMI values were within the healthy range ($range: 16.83 – 21.97$; Time 1 $M (SD) = 19.25 (1.46)$), with 7 (37%) dancers below healthy range (18.5 - 24.9) according to National Institute of Health guidelines (National Institute of Health, 1998). The majority of participants reported low ED symptom levels across assessment time points; 2 individuals (10.5%) reported EDE-Q global scores equal to or exceeding 4.0 at Time 1 (pre-intervention), indicating clinical status (Mond, Hay, Rodgers & Owen, 2006).

*A priori* power was determined for a sample size based on the number of dancers who were eligible to participate, given the inclusion criteria. Power analyses indicated that for statistical regression models with three measured time points, the potential sample size (i.e., 86
dancers were approached for recruitment) was adequate for capturing a small effect size (i.e., .25). Following recruitment that yielded a sample size of 19 dancers, post-hoc power analyses for non-parametric comparisons indicated that with the recruited sample, setting power at .8 with significance level of .05 would yield sensitivity to only detect large effects. This study was completed with approval by, and in accordance with all specifications made by the Institutional Review Board at University at Albany, State University of New York.

3.2 Procedure

Following agreement from administrative staff at each ballet company, initial sessions with the dancers took place in early fall 2016, at the beginning of the conventional dance employment season. Eligible female dancers who consented to participate in the study were randomly assigned to two groups: an intervention group, and a control group (i.e., comprised of those who do not receive the intervention). The intervention includes peer-leadership, which both aids in delivery as well as in continued practice of the main tenets of the intervention, within the participant community (Becker et al., 2012). Prior to beginning the intervention at each site, one dancer was selected from within the randomized intervention group of each company to help facilitate implementation of the intervention. In each case, this young woman was selected by the researcher based on her perceived status as a ‘local champion’ within the group (i.e., of more senior rank and social standing within the company).

At consent, both the intervention and control groups completed questionnaires that assessed ED risk factors (negative affect, thin-ideal internalization, dietary restraint, shape concern, weight concern and ED pathology), as well as provided basic demographic information. For those in the experimental group, the intervention was provided in 3, 1.5 hour sessions, over 3 consecutive weeks. All participants (including individuals in the control condition) completed
follow-up questionnaires re-assessing the same constructs measured at baseline, at the conclusion of the 3-week intervention schedule, and again at approximately 6 weeks post-intervention. Also at the 6-week assessment, dancers who were available from the intervention group to participate attended a 1-hour long focus group led by the researcher to discuss the acceptability and feasibility of this program; with the dancers’ verbal consent, these focus groups were audio recorded for later transcription and analytic purposes.

3.3 The Female Athlete Body Project Intervention

The Female Athlete Body Project Intervention is led by one group leader, along with 1-2 peer leaders, and closely adheres to a manual. The Female Athlete Body Project manual used in the current study was an adaptation of one used in a prior AM-HWI (Becker et al., 2012); this manual is based on one developed by Stice and Presnell (2007). Modifications made by Becker and colleagues (2012) to the original manual included information on the Female Athlete Triad, as well as introduction of the sport-specific thin-ideal and the athlete-specific healthy-ideal. The current manual is also designed to incorporate peer-leadership (e.g., peer-leaders lead participants through certain sections of the manual). Sections within the manual systematically focus on increasing nutritional density (i.e., eating foods that yield increased nutrients relative to calories), and on factors such as sleep, appropriate rest time, and other behavioral health domains that might influence performance, other than modification of weight.

The tailoring of this intervention to align with the language and needs of a particular sociocultural system (i.e., ballet companies) has been successfully undertaken before (i.e., in sororities and athletics) and may be a crucial factor in effectively disseminating this intervention (Becker et al., 2012). Therefore, with the recommendation of the original author, the manual was adapted in an effort to be more effectively used among professional ballet dancers. For
example, in a worksheet included within session materials that provides typical “fat talk” for athletics (e.g. “This uniform makes me look so fat”), some elements were re-worded to be more salient within the ballet environment (e.g., “This leotard makes me look so fat”). Other manual material was appended with language to reflect the dancers’ schedule (i.e., referencing weeks where the dancers are laid-off, rather than an athlete’s ‘off-season’). As well, language within the manual was tailored to reflect members of the dance company staff (i.e., rehearsal directors, ballet masters/mistresses), rather than referencing athletic coaches.

3.3.1 Overview of Sessions

**Session 1:** Participants defined the traditional thin-ideal, ballet-specific thin-ideal, and ballet-specific healthy-ideal, and contrasted the ballet-specific healthy-ideal with both thin-ideals so that all participants understood the differences between the three. Participants discussed benefits of pursuing the ballet-specific healthy-ideal, discussed the energy intake and output balances in their daily nutrition, and learned about the Female Athlete Triad. Participants were also asked to complete a homework assignment which consisted of completing food and exercise logs for three days (two week days and one weekend day) and filling out a goal-setting worksheet in which they wrote down a specific goal pertaining to eating behaviors and a specific goal pertaining to exercise or sleep that they intended to complete in the week before the next session. Participants were also asked to complete a mirror exposure exercise in the week before the next session, where they would view themselves in front of a mirror and list positive qualities (both inner and outer) about themselves.

**Session 2:** Participants compared healthy and unhealthy dietary restriction, discussed environmental influence on food choices, identified ways to make their diets healthier, reviewed benefits of physical activity, and talked about the importance of sleep. Participants
were asked to repeat the eating and exercise/sleep goal setting activity from the previous week for homework. As well, each dancer was instructed to write a letter to a hypothetical young dancer, to be shared in the following session.

**Session 3:** Participants created a list of top ten reasons to pursue the ballet-specific healthy-ideal, identified barriers to pursuing the healthy-ideal and ways to overcome those barriers, and discussed ways to promote the ballet-specific healthy-ideal as a dance company. Dancers also talked about ways in which they might address and counter “fat talk” within their company culture.

**3.4 Measures**

3.4.1 **Ideal Body Stereotype Scale—Revised (IBSS–R; Stice & Agras, 1998).** Thin-ideal internalization was measured with the Ideal Body Stereotype Scale—Revised. Using a 5-point scale, participants indicate how much they agree or disagree (*strongly disagree* = 1, *strongly agree* = 5) with statements promoting a thin-ideal standard of beauty (e.g., “slender women are more attractive”). This measure has demonstrated adequate internal consistency (\(\alpha = .89\)) and test-retest reliability (\(r = .63\)) (Stice et al., 2001; Stice & Agras, 1998) in previous investigation. Internal consistency in the current sample was questionable at Time 1 (\(\alpha = .61\)), poor at Time 2 (\(\alpha = .56\)), and unacceptable at Follow-up (\(\alpha = .22\)).

3.4.2 **Dutch Restrained Eating Scale (DRES; Van Strien, Frijters, Van Staveren & Defares, 1986).** Dietary restraint was measured with the DRES, a 10-item instrument used to measure how often (1 = never, 5 = always, scale range: 1–5) participants report engaging in restrained eating behaviors (e.g., “do you take into account your weight with what you eat?”). While dietary restraint measures have not been shown to be good measures of actual dietary intake (Stice, Fischer & Lowe, 2004) these measures were included in the current study as they
have been shown to predict bulimic pathology (Stice et al., 2004). Prior investigation has determined good internal consistency ($\alpha = .95$) and predictive validity of the DRES (Stice & Agras, 1998; Van Strien et al., 1986). In the current study internal consistency was questionable at Time 1 ($\alpha = .68$) and good for Time 2 ($\alpha = .85$) and Follow-up ($\alpha = .85$).

3.4.3 Eating Disorders Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994). Global eating pathology and body dissatisfaction scores were measured with the EDE-Q. The EDE-Q is a 28-item measure of disordered eating derived from the Eating Disorders Examination interview (Cooper & Fairburn, 1987). This measure is currently in its 6th edition; in addition to its global score, it contains four subscales that are thought to capture the chief attitudes that characterize eating pathology (Dietary Restraint, Shape Concern, Weight Concern, and Eating Concern). The global score is calculated by taking the average of the four subscale scores.

Body dissatisfaction was measured with the weight and shape subscales of the EDE-Q. The 8-item shape concern subscale assesses how frequently participants were concerned about their shape over the past 28 days (e.g., “has your shape influenced how you think about (judge) yourself as a person?” (0 = no days, 1 = 1–5 days, 2 = 6–12 days, 3 = 13–15 days, 4 = 16–22 days, 5 = 23–27 days, 6 = every day). The 5-item weight concern subscale assesses how often participants were concerned about their weight over the past 28 days (e.g., “how dissatisfied have you been with your weight?”). Internal consistency in this study for the shape and weight concerns subscales was consistent with previous research (Time 1 shape concern $\alpha = .82$; Time 1 weight concern $\alpha = .77$; Luce & Crowther, 1999). More recent research has shown that shape and weight concern appear to load onto a single factor, representing body dissatisfaction (Barnes, Prescott & Muncer, 2012). The combined subscale yielding a measure of body dissatisfaction
has 12 items and demonstrated good internal consistency in the current sample (at Time 1, $\alpha = .88$, Time 2 $\alpha = .89$ and Follow-up, $\alpha = .90$).

3.4.4 Positive Affect and Negative Affect Schedule—Revised (PANAS–X; Watson & Clark, 1994). Based upon prior work (Becker et al., 2012), the Fear, Guilt and Sadness subscales of the PANAS-X were used to measure negative affect. On a 5-point scale, 17 items assess to what degree ($1 = \text{not at all}, 5 = \text{extremely}$) participants endorse feeling certain negative emotions (e.g., fear, guilt, and sadness) over the past few weeks. Prior research has found good internal consistency ($\alpha = .95$), convergent validity, as well as predictive validity for bulimic symptom onset (Stice & Agras, 1998; Watson & Clark, 1994). Internal consistency for the current study was good (Time 1, $\alpha = .90$; Time 2, $\alpha = .87$, and Follow-up, $\alpha = .92$).

3.4.5 Qualitative Assessment

Dancers who were randomized to the intervention group were invited to participate in a follow-up focus group interview. The dancers were queried as a group regarding recruitment (i.e., identifying barriers to consent), acceptability (i.e., appropriateness of intervention content, perceived effectiveness of intervention), and feasibility (i.e., suggestions for improvement). The interview was semi-structured, and provided the dancers the opportunity to answer questions, but also to add any other topics to the discussion. The interviews were approximately 1 hour long and with verbal consent from those present, were audio-recorded, and then transcribed.

3.6 Analytic Plan

Analyses were conducted with IBM SPSS 21, with several non-parametric statistical methods. First, internal consistency of all measures was evaluated before conducting further analyses. In addition, Kolmogorov-Smirnov tests were used to evaluate the existence of issues with normality and homogeneity of variance in both conditions, across the three assessment time
points in the dependent variables measured. Before proceeding in further evaluation, Mann-Whitney tests were used to determine if statistically significant differences existed at baseline (i.e., Time 1) between conditions in body mass index (BMI), age, years of dancing professionally, and any of the dependent variables of interest. These tests were repeated, to assess whether differences in these variables existed at baseline between companies. Given recommendations based on nonparametric calculations conducted with a small sample size (Mundry & Fischer, 1998), all measures of significance were calculated as two-tailed exact and corrected for ties, rather than reported as asymptotic.

3.6.1 Did the intervention influence outcomes of the variables of interest?

After preliminary analyses, Wilcoxon signed-rank tests were used to determine if a change in outcome variables of interest between Time 1 (pre-intervention) and Time 2 (post-intervention) evidenced significant differences. These analyses were conducted separately, within each condition.

3.6.2 Were effects of the intervention sustained over time?

Friedman’s ANOVAs were used to determine the existence of significant changes in dependent variables with repeated measurement across time points. These analyses were conducted to assess outcomes in each condition. Follow-up Wilcoxon tests were conducted to identify specifically if changes that occurred (i.e., between Time 1 and 2, or between Time 2 and Follow-up, or between Time 1 and Follow-up) were significant.

3.6.3 Was the intervention acceptable within this population?

Transcriptions of the audio-recorded focus groups were reviewed to determine themes that were evidenced by both companies. Themes that emerged were assessed based on three main questions: 1) What were potential barriers to successful recruitment? 2) What were
positive and negative aspects of the intervention? 3) What might improve future implementation of this intervention?

3.6.1 Benchmarks for success

With its limited sample size and requisite lack of power, the current study should be considered a feasibility study that extends identified aims to address a broader, and potentially more valuable set of research questions. For example, the current study might address whether the current manual (i.e., designed to be implemented with small groups of dancers) is acceptable for use within an entire dance company. As this intervention is an extension of prior work with certain identifiable aims, an a priori primary benchmark for success for an adequately powered version of this study would include statistically driven (i.e., based upon percent reductions) decreases in ED pathology, BD, and internalization of the thin ideal in intervention participants. Given no prior evidence of interventions of this sort within a professional dance population, alternative benchmarks in the current, underpowered study include the feasibility and acceptability of this program within this sample.

Furthermore, should qualitative data indicate the acceptability of this intervention for use in a dance population, future work might then be constructed based upon the feasibility of replicating this design within a larger sample, or within companion groups (e.g., male dancers). This study is the first of its kind to attempt to mitigate specific risk for elevated BD, and ED pathology within female professional ballet dancers, an indisputably vulnerable population. Evidence of its effectiveness in influencing variables of interest, acceptability, and feasibility for use within a group of professional ballerinas may lead to important use of this intervention within not only larger samples of ballerinas, but also other high-risk dancer populations and
important affiliates (e.g., adolescent pre-professional ballet students; artistic and administrative staff).
Chapter 4: Results

4.1 Data Cleaning

A synopsis of participant flow is included in Figure 1. Altogether, 19 individuals participated, 13 from Boston Ballet, and 6 from American Ballet Theatre. Of the total recruited, 10 dancers were randomized to the intervention condition, and 9 were randomized as controls. One hundred percent of participants completed the first assessment, 95% of participants completed the second assessment, and 79% of participants completed both the 6-week Follow-up assessment, and all three assessments. A differential rate of completion for the final assessment was evidenced between the two companies; 100% of dancers from ABT completed all 3 surveys, as compared with 69% of dancers from BB. The four individuals from BB who did not complete the third assessment were potentially compromised in returning assessment materials in a timely manner as they were relocated to a theater offsite shortly after the assessment. These individuals equally represented the control group (2; 50%) and intervention group (2; 50%); as such, frequency of completion was not specific to condition and does not suggest evidence of participant bias.

Prior to analyses, we examined all measures in an evaluation of internal consistency. All measures demonstrated acceptable internal consistency, with the exception of the IBSS; for this reason, we did not include the IBSS in further analyses. Also prior to further analyses, we examined the remaining dependent variables of interest (EDE-Q global scores [EDE-Qavg], dietary restraint [DRES], and body dissatisfaction [EDE-Qbd]) in both conditions at all three time points for indications of violations in normality and homogeneity of variance. Neither the control nor intervention groups demonstrated violations of normality in EDE-Qavg, DRES, and
EDE-Qbd at all three time points. As well, Levene’s tests were non-significant for all three dependent variables in both conditions, across all three measured time points.

4.2 Participant characteristics (Mann-Whitney tests between conditions and between companies)

We examined participant characteristics by condition (Table 1), as well as by company (Table 2). Mann-Whitney tests indicated that there were no significant differences that emerged between conditions in BMI, age, or years of professional dance employment. Additionally, there were no differences between conditions at baseline (i.e., Time 1) in EDE-Qavg, EDE-Qbd, or DRES scores. While these variables were not included in subsequent analyses, baseline scores for PANAS-X Neg and IBSS were also not significantly divergent between conditions at baseline.

In comparing groups based upon company affiliation, Mann-Whitney tests demonstrated significant baseline differences in the number of years participants reported having danced professionally. Despite having the same median value, at Time 1, \( U = 15.00, Z = -2.15, p = .034, r = -.49 \), BB dancers (\( Mdn = 18.00 \)) had been professionally employed for a significantly longer span of time as compared with dancers from ABT (\( Mdn = 18 \)). Baseline values for BMI, age, EDE-Qavg, and EDE-Qbd and DRES were non-significant. While not included in further analyses, scores for IBSS and PANAS-X Neg were non-significant between companies at baseline.

4.3 Effects of Intervention (Wilcoxon signed-rank tests between conditions)

Wilcoxon signed rank tests conducted separately for each condition revealed significant differences on scores of global eating pathology, body dissatisfaction, and dietary restraint between baseline (i.e., Time 1) and post-intervention (i.e., Time 2) for the intervention group, but
not for the control group. Specifically, tests indicated that there was no significant difference for the control group, but there was a significant difference in EDE-Qavg score reduction in the intervention group from Time 1 (Mdn = 2.87) to Time 2 (Mdn = 2.05), T = 1.00, Z = -2.70, p = .004, r = -.60. As well, there were significant differences in the intervention group between Time 1 (Mdn = 3.71) and Time 2 (Mdn = 2.64) assessment (i.e., pre and post-intervention) of body dissatisfaction (EDE-Qbd), T = 0, Z = -2.80, p = .002, r = -.63; the change in EDE-Qbd scores pre to post intervention was non-significant for the control group. Finally, tests indicated that significant differences were evidenced in the intervention group, but not in the control group, for DRES scores from Time 1 (Mdn = 3.45) to Time 2 (Mdn = 3.05), T = 1.50, Z = -2.66, p = .006, r = -.59.

4.4 Intervention effects sustained over time (Friedman’s ANOVA within conditions)

A Friedman’s ANOVA was conducted for each dependent variable, assessing change over 3 measurement time points, within each condition (see Figures 2 - 4). Within the control condition, there were no significant differences across time (Time 1, 2 and Follow-up) for any of the dependent variables. Within the intervention condition, EDE-Qavg scores, \(X^2(2) = 9.75, p = .005\), DRES scores, \(X^2(2) = 9.87, p = .005\), and EDE-Qbd scores, \(X^2(2) = 13.00, p = .000\), showed a significant decrease over time.

Wilcoxon signed rank tests were conducted to follow up on the significant findings within the intervention condition; for all follow-up tests in the following results, a Bonferroni correction was applied and all effects are reported at a .0167 level of significance. For EDE-Qavg scores, Wilcoxon tests indicated that decreases in global eating disorder pathology between Time 1 and Time 2 were significant, \(T = 1.00, Z = -2.70, p = .004, r = -.60\) and between Time 1 and Follow-up, \(T = 0, Z = -2.52, p = .008, r = -.63\). For DRES scores, follow-up Wilcoxon tests
indicated that a decrease in dietary restraint between Time 1 and Time 2 was significant, $T = 1.50$, $Z = -2.66$, $p = .006$, $r = -.59$, and between Time 1 and Follow-up, $T = 0$, $Z = -2.53$, $p = .008$, $r = -.63$. For EDE-Qbd scores, Wilcoxon tests indicated that decreases in body dissatisfaction between Time 1 and Time 2 was significant, $T = 0$, $Z = -2.80$, $p = .002$, $r = -.63$, and between Time 1 and Follow-up, $T = 0$, $Z = -2.52$, $p = .008$, $r = -.63$.

4.5 Qualitative Results

The following results are derived from audio recordings of a session that included 5 ABT dancers, and a separate session of 4 BB dancers. Dancers spoke openly as a group, and their words were later transcribed from these audiotapes to review and assess for prominent themes. There were three main topics of conversation that were the most salient, and resonated across both companies: the issue of recruitment, their opinion of the intervention itself, and then suggestions for improvements in the program to inform future implementation. Specific facets of these three themes are detailed below.

4.5.1 Recruitment

When asked about what they might consider to be barriers to recruitment, both dancers from BB and ABT emphasized several strong reasons, and were in mutual agreement across both companies. The first posited barrier was a potential fear of, or lack of openness to change amongst their colleagues. For both companies, this was described in a nuanced manner, as a fear of being told one was doing something wrong and/or a fear of judgment by others.

Participant from BB: “... like you are doing something wrong, like that maybe this was going to point out this, you shouldn’t be doing that, change this way. I think people were just scared of making a change maybe. Or having someone tell them what they are doing is wrong.”

Participant From ABT: “Maybe you are afraid of other people telling you that you are doing something wrong and you have to change it. Maybe being fearful of people judging you for what you are used to doing.”
Another barrier to recruitment that was strongly emphasized by members of both companies was the sensitivity of the topic (i.e., ED) and either a denial of having a problem with eating behavior, and/or a lack of wanting to share this information with co-workers.

Participant from BB: “Yeah, I think some people may not want to be seen as vulnerable. And talking about our vulnerabilities in this way is difficult, and very personal – and I think a lot of people don’t want to get that personal with [colleagues].”

Participant from ABT: “I think anything where you see nutrition and eating disorders on a piece of paper, people see that and instantly are like “I don’t want to do that,” “I don’t want to address it,” “I don’t want to look into what I am eating.”

A third theme that emerged as a barrier to recruitment was a skepticism and resignation that despite any efforts on their individual part, systemic issues that contribute to ED within their dance environment will not be able to change.

Participant from BB: “I feel like all of us have heard so much about nutrition and eating disorders, that I have this feeling that people, and I sort of have the feeling too but I don’t know, it’s kind of grim but I feel like the ballet world is never going to change.... And it’s something that I am not happy about and I wish that it would change but I just kind of have this feeling that it is not going to. But I chose to participate because it’s something that frustrates me that it’s part of the job. But I feel a lot of people are just like ... they’re kind of like what’s the point?”

Participant from ABT: “I don’t know if it is ever going to fully change because [...] it’s really hard to change people’s mind-sets on body image. So, we could definitely improve upon it but I don’t think there is ever going to be that company that is completely everyone is happy with the way they are, and everyone is not comparing themselves, because there is always that competition, especially in ballet.”

Some dancers suggested that buy-in from colleagues might be enhanced if the focus on ED pathology was masked, and instead emphasis in recruitment materials was placed on the aim of the intervention as designed to make the working environment ‘more positive.’

4.5.2 Intervention

Overall, dancers from BB expressed enthusiasm for the intervention, and stated that they enjoyed all aspects of self-monitoring, and homework assignments. In contrast, and likely as a result of the difficulty in scheduling, ABT dancers voiced that they felt rushed through their
intervention, and felt less benefit from the handouts and homework assignments. Some ABT dancers mentioned that they enjoyed being able to identify that they were not alone in their individual experiences with targets of the intervention (e.g., struggles with dietary choices). Dancers from both companies expressed a desire for more explicit nutrition counseling, and more individualized time within the intervention to pursue more specific dietary recommendations, personalized not only to dancers in general, but tailored specifically to themselves. Additionally, BB dancers expressed that they felt the manual and delivery were appropriately modified for use in a dancer population.

Participant from BB: “[I liked] all the information, it’s so much, it was information that felt tailored to dancers, it wasn’t, it didn’t feel like the generic. Because I know you are a dancer too [group leader] so it didn’t feel like the generic ‘have a scoop of peanut butter’ things that you are used to hearing from everyone.”

Participant from ABT: “For me it was talking and realizing that everyone has something that they want to improve on and I guess feeling less like I’m the only person in the room with that kind of issue.”

4.5.3 Suggestions for Improvement

Both companies recommended that the order of topics should not begin the way the manual does, with an emphasis on body image, which they found very personal and sensitive to discuss. In each company, a dancer introduced this idea, and all others present agreed. They stated that beginning with a topic that was more innocuous (e.g., sleep hygiene rather than body image) might have boosted their initial comfort level with their fellow group members.

Also in both companies, there was a desire to have greater participation amongst their peers. This was described as feeling as if the benefits of the intervention would be more powerful and lasting if they were disseminated throughout the respective company, as well as a knowledge that perhaps those who might need intervention for eating pathology most would not volunteer to participate for various reasons (see above, and barriers to recruitment).
Participant from BB: “[Making the intervention mandatory] would be amazing because then everyone would be here. That’s what I’m saying is that’s the hard thing is the recruitment aspect because people who have an issue who, say from the outside, we know have an issue but they maybe themselves are like ‘I’m fine.’”

Participant from ABT: “I think it would be very good [Having more people participate], it opens up a whole heap of conversations that you don’t normally have.”

Finally, across both companies, there was a strong desire for a companion module of this intervention to be delivered to artistic and other administrative staff. There was a collective curiosity from all dancers about the perception of staff regarding the problems they (the dancers) felt were intrinsic to the dance world with body ideals and eating pathology. Furthermore, all dancers felt that the changes that might be brought about from having staff include may be more powerful and sustainable.

Participant from BB: “I feel like as if we were all in a room and if I heard someone from artistic say ‘listen we’re a little bit concerned by some things we’ve seen’ I think that would make me feel better, because sometimes it feels that it [i.e., being too thin] is actually encouraged …”

Participant from ABT: “I think [an intervention beyond just for females] would be interesting to do, to see the other points. This is just female dancers in the company so having boys and staff and it would kind of be interesting to see if they had the same opinions.”

In summary, dancers of both companies collectively reported that this intervention was both feasible and acceptable for implementation within this population. Furthermore, some dancers emphasized how important and necessary this work was, indicating support for its continuation in future programming. Below are concluding thoughts from a dancer in Boston Ballet.

Participant from BB: “…I think the work you are doing is very important and we are behind you [group leader] 100%.”
Chapter 5: Discussion

The current study assessed the effects of an athlete modified healthy weight intervention amongst female professional dancers. Dancers from two elite ballet companies were randomized to either the intervention condition or to a control condition; all dancers were assessed at consent (i.e., pre-intervention), following the intervention time period, and at a 6-week follow-up. Dancers from both companies were combined for analyses, stratified by condition. Initial analyses did not indicate significant baseline differences between dancers in each condition.

Dancers in the intervention program demonstrated significant decreases in reported BD, dietary restraint, and a global measure of ED pathology. Significant differences were found between pre- and post measurement of these three variables of interest amongst those who participated in the intervention; no significant changes were evidenced for those in the control condition. Further, for the three variables that evidenced significant differences between Time 1 (i.e., pre-intervention) and Time 2 (i.e., post intervention) amongst those in the intervention group, these reductions were maintained at 6-week follow-up. For the intervention group, decreases in BD, dietary restraint and ED pathology were retained at follow-up and demonstrated significant reduction as compared to pre-intervention assessment. No significant reductions in any variables of interest were demonstrated in the control group.

Our assessment of internalization of the thin ideal demonstrated a lack of internal consistency within the measure used. Despite evidence that internalization of the thin ideal is consistently associated with ED pathology, the measure used in this study (i.e., IBSS) did not appear to be an appropriate scale for use in this population. Certain items (e.g., “Tall women are more attractive) may be endorsed by individuals who subscribe to a typical Western feminine ideal, but perhaps may not be consistently endorsed by dancers. In this example, being tall may
hinder a female dancer’s ability to be partnered by a male dancer, which would impact their professional status negatively. As such, an item such as this one may not be rated highly by dancers, even by those who would otherwise subscribe to other items associated with a typical physical ideal. Given the questionable nature of the measure, findings from the IBSS were not included in study analyses; future work would benefit from replicating assessment with a modified version of this measure that might more effectively capture this construct within professional female dancers.

As an additional primary aim of the study, above and beyond whether the intervention was found to provide significant results in key variables, was the ability to be able to conceptualize this intervention as both feasible, and acceptable in this ballet population. Following focus groups conducted at the 6-week follow-up with dancers who had participated in the intervention, review of the qualitative data was encouraging. Specifically, dancers from both companies reported that the intervention was feasible and very acceptable, with minimal suggestions offered with which to improve it in future iterations. More importantly, all dancers emphatically voiced a desire to have more of their peers participate in this program, as they felt that it would not just be beneficial, but genuinely called for, to improve the current health status of the environment in which they worked. In acknowledgment of the difficulty in recruiting for the current study, dancers who participated in the program identified potential barriers to recruitment, and offered suggestions for ways in which recruitment might be improved in future implementation. Several dancers agreed that emphasis in recruitment materials should be shifted from ED-specific language, and instead, focus on descriptions of the intervention’s capacity to create a more ‘positive environment’ within the dance company.
It should be noted that several dancers reported skepticism about the longstanding retention or import of change with this intervention without the inclusion of a companion intervention that included administrative/artistic staff members. Dancers who expressed this idea reported that the problems with BD and eating pathology within their environment were both precipitated, and maintained by actions taken by members of administrative and supervisory staff. These findings suggest the importance of addressing this intervention as being potentially more effective if applied systemically.

In summary, the intervention demonstrated significant reduction in body dissatisfaction, dietary restraint, and a global measure of eating pathology for those who participated, and not for those in the control group. These findings were maintained at 6-week follow-up assessment, suggesting that the beneficial effects of the intervention may be sustainable over time. Reduction of these specific domains is important, as they are indicated as strongly associated for risk and maintenance of eating pathology. As such, the current study indicates that this dancer-modified healthy weight population may serve as an important means of mitigating ED risk among professional dancers. This study is the first of its kind to address this pertinent problem in professional dancers, who comprise a vulnerable population within elite athletics. The feasibility, acceptability, and suggested effectiveness of the current study intervention holds great promise for its benefit to the field, not only in professional dance, but more broadly within aesthetic athletes.

5.1 Limitations

The current study had several limitations. Beginning with participant recruitment, due to constraints of time and dance company budget, initial recruitment meetings were organized for each company on the dancers’ own time, during hours when they might otherwise be able to rest,
or go home at the end of a long day; as such, future recruitment might benefit from being held
during exclusively paid time. Additionally, some dancers within our focus group speculated that
others in the company might have perceived the current study as connected to recent mention by
their employer of health and nutrition in relation to contract status, and therefore may have
construed the recruitment as threatening to their employment status.

Another limitation arose within the context of scheduling the intervention. During the
intervention weeks, the schedule coordination for each company was difficult to arrange such
that on many occasions when intervention sessions were held, it was necessary to hold one half
of the session in the morning, and complete the session later in the afternoon. It is possible that
this disruption in the session as a whole might have influenced the comprehensive learning from
each individual session, particularly for the dancers from ABT.

Finally, on the whole, the sample size of this study can only yield preliminary and
feasibility data and therefore lacks statistical power, as well as generalizability. More advanced
statistical modeling might include other variables assessed as potential moderators (i.e., negative
affect; weight suppression); future work will benefit from an increased sample size.

5.2 Conclusions

The current study intervention demonstrated significant change (sustained over time) for
participants in eating disorder pathology, and factors that precipitate and maintain ED, body
dissatisfaction and dietary restraint. Additionally, this intervention appeared to be acceptable
and feasible as it was currently implemented in this (aesthetic athlete) population. Despite
preliminary evidence that this intervention is both an effective, and feasible program to mitigate
ED pathology in female professional dancers, the current study was limited by sample size.
Future work with this intervention in larger groups might have more generalizable impact in aiding in the dissemination of health-promoting behaviors among elite aesthetic athletes.
References


De Bruin K. Thin is going to win? The role of body image in women athletes’ disordered eating. Invited presentation for the Athlete Special Interest Group Meeting at the 2010 International Conference on Eating Disorders; Salzburg, Austria. 2010.


National Collegiate Athletic Association: NCAA Coaches Handbook: Managing the Female Athlete Triad. Indianapolis, IN, National Collegiate Athletic Association, 2005


dancing to perfection? Correlates of perfectionism among ballet and contemporary
dancers. *Journal of clinical sport psychology, 5*(1), 58-76.

Penniment, K. J., & Egan, S. J. (2012). Perfectionism and learning experiences in dance class as
risk factors for eating disorders in dancers. *European Eating Disorders Review, 20*(1),
13-22.

Peric, M., Zenic, N., Sekulic, D., Kondric, M., & Zaletel P. (2016). Disordered eating,
amenorrhea, and substance use and misuse among professional ballet dancers:


Primary Prevention, 20*(1), 75-90.

of eating disorders*, 357.

body dissatisfaction, and disordered eating in aerobic instructors and aerobic

and locus of control in women college ballet dancers. *Perceptual and motor skills,
95*(3_suppl), 1239-1247.


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*Note. EDE-Qavg = Eating Disorders Examination Questionnaire – average global scores; EDE-Qbd = Eating Disorders Examination Questionnaire – body dissatisfaction; DRES = Restrained Eating Scale scores; PANAS-X Neg = Positive Affect and Negative Affect Scale – negative emotion; IBSS = Ideal Body Stereotype Scale; BMI = Body Mass Index; Years Pro = years dancing professionally*
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Note: BB = Boston Ballet; ABT = American Ballet Theatre; EDE-Qavg = Eating Disorders Examination Questionnaire – average global scores; EDE-Qbd = Eating Disorders Examination Questionnaire – body dissatisfaction; DRES = Restrained Eating Scale scores; PANAS-X Neg = Positive Affect and Negative Affect Scale – negative emotion; IBSS = Ideal Body Stereotype Scale; BMI = Body Mass Index; Years Pro = years dancing professionally.
Figure 1. Consort Flow Diagram
Figure 2. EDE-Q median global scores across three measurement time points, by group. Time 1 = pre-intervention, Time 2 = post-intervention, Follow-up = at 6 week follow-up. EDE-Q = Eating Disorder Examination Questionnaire. Standard errors are represented in the figure by the error bars attached to each column.
Figure 3. EDE-Q median body dissatisfaction scores across three measurement time points, by group. Time 1 = pre-intervention, Time 2 = post-intervention, Follow-up = at 6 week follow-up. EDE-Q = Eating Disorder Examination Questionnaire. Standard errors are represented in the figure by the error bars attached to each column.
Figure 4. Dietary restraint median scores across three measurement time points, by group. Time 1 = pre-intervention, Time 2 = post-intervention, Follow-up = at 6 week follow-up. DRES = Dutch Restrained Eating Scale. Standard errors are represented in the figure by the error bars attached to each column.