

## Specific predictors of disordered eating among elite and non-elite gymnasts and ballet dancers

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*Gymnasts and ballet dancers are considered at-risk groups for developing eating disorders. However, specific variables enrolled in this risk and the relative contribution of each one remain unclear. The present study investigated correlates of disordered eating (DE) among young female and male aesthetic performers (N = 249, mean age = 15.41, SD = 2.55) and the relation between potential individual and contextual predictors of DE. Ballet dancers (n = 113; 88.5% female) and gymnasts (n = 136; 75% female) from elite and non-elite levels completed questionnaires measuring DE, body image dissatisfaction (general and activity-specific), self-esteem, pressure to be thin and social support in their dance schools and gymnastics clubs. Differences between males and females (elite and non-elite) were analyzed among ballet dancers and gymnasts. A usefulness analysis showed that dissatisfaction with body image specific to the practice of a particular aesthetic activity is the best predictor of DE compared to dissatisfaction with body image in general, especially in dancers. In addition to self-esteem and activity-specific body image dissatisfaction, hierarchical regression analysis showed that the pressure to be thin was more important than the competitive level for understanding aesthetic performers' DE. Social support was not predictive of DE. Structural equation modeling confirmed that self-esteem and body image dissatisfaction partially mediate the influence of pressure to be thin on DE. Some clues to possible systemic actions for preventing DE in gymnastics clubs and dance schools, which should include both aesthetic performers and coaches/teachers, are discussed.*

KEY WORDS: Ballet dancers, Body Image Dissatisfaction, Disordered Eating, Gymnasts, Pressure to be thin, Self-esteem, Social support.

Ballet dancers and gymnasts, as “aesthetic performers”, are considered high-risk groups for developing eating disorders. Despite clear differences among them (for example, ballet has a fundamentally artistic component,

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while gymnastics has a strong athletic component in addition to the artistic one), the majority of research in this area has integrated dance and gymnastics into the group of aesthetic or leanness sports (see meta-analysis by Hausenblas & Carron, 1999; Smolak, Murnen, & Ruble, 2000) because of their similar demands in terms of extreme pressure to be thin and long hours of physical training (Davis & Strachan, 2001). These studies have revealed a significantly higher prevalence of clinical and subclinical eating syndromes in these particular groups of “athletes” than in athletes of other sports and in the general population (Sundgot-Borgen, 1994; Toro, et al., 2005; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008). In addition, elite athletes present higher levels of eating disorders compared to non-elite athletes (e.g., Byrne & McLean, 2002; Garner & Garfinkel, 1980; Sundgot-Borgen & Torstveit, 2004). Although the specific risk and protective factors, in the context of aesthetic performers, that might trigger (or buffer) disordered eating are not yet very clear (Petrie & Greenleaf, 2007), their identification is essential for the development of adequate systemic preventive interventions (e.g., Piran, 1999).

Petrie and Greenleaf (2007) provided a theoretical framework to analyze risk and protective factors for eating disorders in athletes. Their etiological model is essentially based on sociocultural models for the general population (e.g., Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004; Stice, 2001), to which they added sport-specific pressures regarding weight, body shape and performance (e.g., de Bruin, Oudejans, & Bakker, 2007; Thomas, Keel, & Heatherton, 2005), along with general societal pressures to achieve a socially determined body shape. The authors consider their model a “starting point” and encourage researchers to consider and test other potential influences, especially based on data from qualitative research, that “can be useful in furthering our understanding of how athletes, male and female, experience the sport environment and how those experiences influence their lives” (Petrie & Greenleaf, 2007, p. 369). A recent qualitative exploratory study of the contexts of elite gymnastics and professional education in classical dance in Portugal identified the pressure to be thin as a main contextual risk factor in these environments (Francisco, Alarcão, & Narciso, 2012). This pressure can come to young athletes in the form of critical comments from teachers/coaches and peers about eating, weight and food, but it can also be internalized as an implicit rule imposed by the subculture of classical dance and gymnastics. This pressure is especially noticeable with females, and it has been confirmed in previous studies with other samples of athletes and dancers (Byrne & McLean, 2002; de Bruin, et al., 2007; Kerr, Berman, & De Souza, 2006; Muscat & Long, 2008; Sundgot-Borgen, 1994; Toro, Guerrero,

Sentis, Castro, & Puértolas, 2009). Conversely, Francisco et al. (2012) consider specific social support in the contexts of gymnastics and ballet dance to be a possible protective factor against disordered eating because of the importance given by young elite aesthetic performers to a positive relationship with teachers/coaches and to parental support for many aspects of dance or gymnastics.

Thomas, Keel and Heatherton (2005) suggested a combination of individual and environmental factors that determine the phenotypic expression of eating disorders. In their study, ballet dancers attending national schools presented disordered eating behaviors that exceeded those of regional and local students but had similar levels of perfectionism and drive for thinness as local students. However, there is a lack of studies about adolescents who practice dance, specifically classical ballet, recreationally or non-professionally. In one of the first studies that compared professional female young ballet students and amateurs (Doumenc, Sudres, & Sztulman, 2005), professional dancers reported BMIs, current and ideal weights lower than those reported by amateur dancers. However, professional dancers did not present significantly higher levels of eating disorders or body dissatisfaction when compared to amateurs. Nevertheless, in a more recent study with similar methods, professional dancers were more concerned with their weight, despite being more satisfied with various areas of their body than were amateur dancers (Pollatou, Bakali, Theodorakis, & Goudas, 2010).

Both low self-esteem and body image dissatisfaction appear to be important psychological determinants in the development of eating disorders in the general population (Jacobi, et al., 2004), and both are frequently considered mediators of the influence of pressure to be thin on disordered eating (e.g., Ata, Ludden, & Lally, 2007; Stice & Shaw, 2002). However, data about athletes and dancers are not very consistent and the relative importance of each variable for their disordered eating is unclear.

Despite having a body mass index (BMI) that is lower than that of control groups (Bettle, Bettle, Neumärker, & Neumärker, 1998; Toro, et al., 2009), female ballet dancers and dance students in professional ballet schools report, in general, a desire to achieve an even lower weight, below 82% of normal body weight (Bettle, et al., 1998). Traditionally, most studies have reported that female ballet dancers are lower in self-esteem and body image satisfaction than are female non-dancers (e.g., Anshel, 2004; Bettle, Bettle, Neumärker, & Neumärker, 2001; Ravaldi, et al., 2006) and that they show symptomatology similar to that found in patients with eating disorders (Davis & Strachan, 2001; Ringham, et al., 2006). However, some more recent studies have presented more positive results (especially when modern dance

or other dance styles are included), as lower prevalence of eating disorders than on previous studies (Nordin-Bates, Walker, & Redding, 2011), similar levels of eating disorders between dancers and non-dancers (Toro, et al., 2009), as well as relatively high self-esteem and low body dissatisfaction (Quested & Duda, 2011b).

Similar to female ballet dancers, female gymnasts (elite or non-elite) also seem to want to lose more weight than females in the control group, even though they show a significantly lower BMI (de Bruin, et al., 2007). Another study revealed similarities in the physiques of elite rhythmic gymnasts and Anorexia Nervosa patients, although they were not similar on measures related to eating disorders; on these measures, elite rhythmic gymnasts presented similar values to non-athletes (high school students) (Salbach, Klinkowski, Pfeiffer, Lehmkuhl, & Korte, 2007). These data contrast with those of previous studies that showed a high frequency of pathological eating and weight control behaviors among female collegiate gymnasts (Petrie, 1993; Rosen & Hough, 1988), which was associated with lower self-esteem and body satisfaction (Petrie, 1993).

Research has focused largely on female athletes and dancers, with few exceptions. Although male ballet students present higher levels of body image dissatisfaction than non-dancers, this dissatisfaction is not associated with a greater drive for thinness (Neumärker, Bettle, Neumärker, & Bettle, 2000), possibly because they already show a significantly lower BMI than non-dancers (Bettle, et al., 2001). Despite having similar BMIs (Bettle, et al., 1998), male dancers seem to be more satisfied with their bodies than their female counterparts, which may reflect a greater pressure on female dancers to have extremely thin bodies. Ballet's aesthetic ideal is an extremely thin body, so to attain it is considered a sign of dedication and success (Francisco, et al., 2012; Gvion, 2008). A recent study revealed equal proportions of female and male dancers with disordered eating, which could be related to the fact that these dancers were from contemporary and mixed dance styles, not primarily classical ballet (Nordin-Bates, et al., 2011). On the other hand, we are unaware of studies that focus specifically on the eating habits of male gymnasts (or that compare female and male gymnasts) because most studies integrate male gymnasts into groups of lean sports. The results of these studies have proved to be somewhat inconsistent. While some studies have shown levels of eating disorders comparable to those found in athletes of non-lean sports and normative groups (Petrie, 1996), other more recent studies emphasize a higher risk in lean male athletes, who show higher levels of disordered eating and body dissatisfaction than non-lean male athletes (Milligan & Pritchard, 2006). Disordered eating and possible correlates

should be investigated among male dancers and gymnasts, in order to better understand the risk of development of eating disorders associated to their participation in these aesthetic activities.

As contexts where a focus on and an over-concern with body image is common, body image dissatisfaction makes ballet dancers and gymnasts more susceptible to extreme and inappropriate eating and weight control behaviors (Davis, 1992; Davis & Strachan, 2001; Muscat & Long, 2008; Petrie, 1993; Williamson, et al., 1995). However, a meta-analysis by Hausenblas and Downs (2001) shows that, in general, athletes have greater satisfaction with their body image than non-athletes, and no differences were found among athletes in aesthetic, endurance and ball game sports. These apparently contradictory findings may have resulted from the concept of “body image” that the athletes were asked to consider. Indeed, the aesthetic/performance requirements of each sport/activity imply that in many cases, the ideal body image conveyed by society in general is quite different from the ideal body image for the practice of a particular activity, leading many athletes, especially females, to live a paradox in relation to their body image (Krane, Choi, Baird, Aimar, & Kauer, 2004; Russell, 2004). Regarding ballet dancers, Toro and colleagues (2009) showed that a BMI above 18 in female ballet students was significantly associated with intense dissatisfaction with weight for artistic reasons but not for personal reasons. Given the results described, it seems important to assess body image dissatisfaction among aesthetic performers both in terms of associations with the activity performed (activity-specific body image dissatisfaction) and in terms of associations with daily life and current social standards (general body image dissatisfaction). Our hypothesis is that activity-specific body image dissatisfaction better predicts disordered eating in athletes and dancers than does general body image dissatisfaction, especially among elite aesthetic performers.

To better understand the heightened risk for disordered eating in aesthetic performers, the aim of this quantitative study was to explore potential specific contextual and individual variables related to disordered eating in a sample of male and female gymnasts and ballet dancers from different competitive levels. As defended by Petrie and Greenleaf (2007) in their etiological model, we assumed that body dissatisfaction and self-esteem mediate the relation between pressure to be thin and disordered eating. In addition to this pressure to be thin specific to the contexts of ballet dance schools and gymnastics clubs, we investigated another specific contextual factor as possible predictor of (and protector against) disordered eating – social support – as suggested by the findings of our previous qualitative study (Francisco, et al., 2012).

In the first part of the study, we compared both female and male ballet dancers and gymnasts from different competitive levels in terms of BMI, self-esteem, general and activity-specific body image dissatisfaction, disordered eating, pressure to be thin and perceived social support at their dance schools and gymnastics clubs. In the second part, we explored possible individual and contextual predictors of disordered eating and their relation in the sample of aesthetic performers: first, we tested the ability of two indicators of body image dissatisfaction to predict aesthetic performers' disordered eating, separately for gymnasts and ballet dancers; second, through regression analysis, we examined which variables (individual and contextual) would best predict disordered eating among aesthetic performers; and third, we tested the hypothesized mediational model using structural equation models.

Contrary to most studies that include mainly collegiate athletes, we selected a sample of adolescent ballet dancers and gymnasts because female and male athletes appear to initiate weight control behaviors during puberty or adolescence (Sundgot-Borgen, 1994), as also occurs in the general population (e.g., Jacobi, et al., 2004). This is also the best period to identify athletes and dancers as at risk for disordered eating and to implement preventive measures.

## Method

### PARTICIPANTS

The participants in this study were 249 young ballet dancers ( $n = 113$ ) and gymnasts ( $n = 136$ ) of both sexes, with a mean age of 15.41 ( $SD = 2.55$ ), living in different parts of Portugal, including the Lisbon metropolitan area (54.6%); the north (20.5%), the center (17.3%), the south (6.8%) of the country, and the Madeira Islands (0.8%).

The elite dancers group consisted of 66 ballet students (53 females and 13 males; mean age = 14.53,  $SD = 2.28$ ) from two professional dance schools in Portugal that provided instruction in both academics and the arts. The group of non-elite dancers included only females<sup>1</sup> ( $n = 47$ ; mean age = 14.57,  $SD = 2.30$ ) from eight ballet dance schools that provided only a recreational dance education.

The group of gymnasts included athletes from four different disciplines – acrobatics ( $n = 62$ ), trampoline gymnastics ( $n = 28$ ), rhythmic gymnastics ( $n = 27$ ) and artistic gymnastics ( $n = 19$ ) – from 16 Portuguese gymnastics clubs. The 69 gymnasts who participated in international competitions (i.e., high level competitions) were considered the elite group (50 females and 19

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<sup>1</sup> At the time of the study, only two males in the recreational dance schools were old enough to participate in the study and were therefore excluded.

males; mean age = 16.33, SD= 2.59), while the others were considered the group of non-elite gymnasts (52 females and 15 males; mean age= 15.27, SD= 2.56).

## PROCEDURE

In collaboration with the Portuguese Gymnastics Federation, the coordinators of 16 national gymnastics clubs were approached. In addition, we contacted the coordinators of 10 professional and recreational ballet dance schools. All of them agreed to cooperate, and parental and adolescent informed consent was obtained. The data collection was scheduled around training or class times and occurred in small groups in the presence of the researcher (first author) and without the presence of coaches/teachers. Some participants who were not able to participate in the group sessions received the surveys from the researcher or from the teachers/coaches to answer at home; they subsequently returned the surveys in sealed envelopes without any form of identification. It took the participants approximately 40 minutes to fill out the survey. The research design was reviewed and approved by the Fundação para a Ciência e a Tecnologia (Portugal) and by the Postgraduate Study Commission of the Faculty of Psychology of Lisbon University.

## MEASURES

*Demographics.* Participants were asked to indicate their sex, age, height, weight, and competitive level (professional/recreational for ballet dance students; participation in regional, national, and/or international competitions for gymnasts). The BMI ( $\text{kg}/\text{m}^2$ ) of each participant was calculated using self-reported data.

*Pressure to be Thin and Social Support.* To assess perceptions of behaviors, attitudes, negative beliefs and pressures regarding weight control in gymnastics clubs/dance schools, as well as perceptions of social support received by or provided to aesthetic performers in those contexts by coaches/teachers or parents, we used the "Pressure to be Thin" (12 items; e.g., "comments about weight and body shape are common") and "Support" (15 items; e.g., "athletes (students) and coaches (teachers) have an easy-going relationship") subscales from the Climate in Sport Setting Scale (CISSS, Buchholz, Mack, McVey, Feder, & Barrowman, 2008), originally developed for the context of gymnastics. A version was also adapted to the context of dance schools. Items were rated on a 5-point Likert scale from 1 (completely agree) to 5 (completely disagree), following the stem, "Think about your gymnastics club (or dance school). What is it usually like in your club (school)? In my club (school)..." The results from the psychometric study of the original instrument show that the internal consistency of the "Pressure to be Thin" subscale for adolescent gymnasts was  $\alpha = .72$  and that this subscale correlated significantly with other risk factors such as body esteem and eating attitudes (Buchholz, Mack, Steringa & Matthias, 2003, cit. by Buchholz et al., 2008). In this study, both subscales demonstrated adequate internal consistency (Pressure to be Thin  $\alpha = .83$ ; Support  $\alpha = .78$ ).

*Self-Esteem.* To assess participants' global self-esteem, we used the Portuguese version of the widely used Rosenberg Self-Esteem Scale (RSES, Rosenberg, 1965; Faria, 2000), a self-report measure consisting of 10 statements related to self-esteem to which participants respond on a 6-point Likert scale from 1 (strongly disagree) to 6 (strongly agree). Both the

study adapting the measure to the Portuguese adolescent population (Azevedo & Faria, 2004) and the present study revealed that the scale has good internal consistency ( $\alpha = .89$  for both).

*Body Image Dissatisfaction (BID)*. Body image dissatisfaction was evaluated using the Contour Drawing Rating Scale (CDRS, Thompson & Gray, 1995), which consists of a sequence of nine silhouettes, ordered from very thin to very large. The discrepancy between the silhouettes that participants select to represent their current and ideal body size is considered the indicator of general BID. The higher the value of the discrepancy, the greater the BID; a negative sign in the value of the discrepancy indicates BID with a desire to have a thinner image, while a positive sign indicates BID with a desire to have a larger image than the current. The construct validity of the Portuguese version used (Francisco, Narciso, & Alarcão, 2012) was established with a sample of 1423 adolescents and adults by correlating the silhouette representative of actual body size with actual weight ( $r = .65$ ) and BMI ( $r = .72$ ). The test-retest reliability (interval of two weeks) estimated with a sample of university students ( $n = 55$ ) was adequate ( $r = .91$ ). In the present study, participants were also asked to indicate the silhouette they regarded as ideal specifically for the practice of classical dance/gymnastics, so the discrepancy between the current body size and this specific ideal body size was considered the activity-specific BID indicator.

*Disordered Eating (DE)*. To assess participants along a continuum of disordered eating (Shisslak, Crago, & Estes, 1995), we used the Portuguese version of the 5<sup>th</sup> edition of the Eating Disorder Examination-Questionnaire (EDE-Q, Fairburn & Beglin, 1994; Machado, 2007), a self-report questionnaire consisting of 28 items that are rated on a 7-point Likert scale from 0 (None/Nothing) to 6 (Every day/Extremely). It is organized into four subscales (Restraint  $\alpha = .87$ ; Eating Concern  $\alpha = .86$ ; Weight Concern  $\alpha = .82$ ; and Shape Concern  $\alpha = .91$ ), the mean of which results in a global score ( $\alpha = .95$ ); each subscale and the global score have demonstrated adequate internal consistency with an adolescent population (Machado & Martins, 2010). In this study, only the global score was used as a global indicator of the severity of DE, and it again demonstrated a good level of internal consistency ( $\alpha = .90$ ).

## DATA ANALYSIS

Given the small size of the groups of males ( $n < 30$ ), several Kruskal-Wallis nonparametric tests were performed to compare participants on all study variables. Each group of aesthetic performers was separated by sex and competitive level. When differences were found between groups, the Mann-Whitney nonparametric test was used as *post hoc* procedure, using the Bonferroni correction ( $p < .0167$ ) as suggested by Field (2009). Effect sizes were also calculated as suggested by Rosenthal (1991, cit. in Field, 2009). Regression analyses were used to select significant predictors of DE to include in the hypothesized model of relations between the variables, including the mediating effect of individual variables from contextual variables to disordered eating. To test the model, we used structural equation modeling (SEM) with the AMOS software package (Arbuckle, 2007). In all analyses, the Maximum Likelihood Estimation Method and the covariance matrix were used. The overall goodness-of-fit was based on the combination of several fit indices recommended by Hu and Bentler (1999). Models were compared based on Chi-square difference tests and on other fit indices: the *Standardized Root Mean Square (SRMR)*, the *Incremental Index of Fit (IFI)*, the *Bentler Comparative Fit Index (CFI)*, and the *Root Mean Square Error of Approximation (RMSEA)*.



## Results

### DIFFERENCES BETWEEN SEX AND COMPETITIVE LEVEL BY ACTIVITY

Descriptive statistics for all study variables and results of mean comparisons are presented in Table I, separately for ballet dancers and gymnasts.

#### *Body Mass Index (BMI)*

Regarding ballet dancers, there were no significant differences in BMI, neither related to sex nor to competitive level. As for gymnasts, elite males reported significantly higher BMIs than elite females ( $U = 220.00$ ,  $z = -2.88$ ,  $p < .01$ ,  $r = -.36$ ) and non-elite females ( $U = 221.50$ ,  $z = -3.07$ ,  $p < .01$ ,  $r = -.37$ ), but they reported similar BMI to non-elite males.

#### *Self-Esteem*

The three groups of ballet dancers did not present statistically significant differences regarding self-esteem. Among the gymnasts, elite males reported higher self-esteem than elite ( $U = 245.50$ ,  $z = -3.09$ ,  $p < .01$ ,  $r = -.37$ ) and non-elite females ( $U = 254.00$ ,  $z = -3.12$ ,  $p < .01$ ,  $r = -.37$ ), but they reported similar levels to non-elite males.

#### *Body Image Dissatisfaction (BID)*

There were significant differences in the three groups of ballet dancers concerning both indicators of BID. Elite females appeared more dissatisfied than elite males (general BID  $U = 154.00$ ,  $z = -3.15$ ,  $p < .001$ ,  $r = -.39$ ; activity-specific BID  $U = 129.00$ ,  $z = -3.56$ ,  $p < .001$ ,  $r = -.44$ ) and non-elite females (general BID  $U = 862.50$ ,  $z = -2.74$ ,  $p < .01$ ,  $r = -.27$ ; activity-specific BID  $U = 866.00$ ,  $z = -2.72$ ,  $p < .01$ ,  $r = -.27$ ), wishing to present a thinner body than the current. The males also differed from non-elite females on activity-specific BID ( $U = 180.00$ ,  $z = -2.37$ ,  $p < .01$ ,  $r = -.31$ ) but not on general BID, the former being more satisfied than the latter. Comparing the values of both indicators of BID, the Wilcoxon signed-rank test indicated that elite ( $T = 0$ ,  $z = -5.32$ ,  $p < .001$ ,  $r = -.51$ ) and non-elite ( $T = 0$ ,  $z = -4.60$ ,  $p < .001$ ,  $r = -.47$ ) female ballet dancers were significantly more dissatisfied with their image as a dancer than with their overall image. Males showed a closer approximation ( $T = 0$ ,  $z = -1.73$ ,  $p = .250$ ,  $r = -.40$ ) between the two ideal images.

TABLE I  
Descriptive Statistics and Kruskal-Wallis Mean Comparisons in Ballet Dancers and Gymnasts

Range	Ballet dancers				Gymnasts				
	Elite male (n = 13)	Elite female (n = 53)	Non-elite female (n = 47)	K-W	Elite male (n = 19)	Elite female (n = 50)	Non-elite male (n = 15)	Non-elite female (n = 52)	K-W
	M (SD)	M (SD)	M (SD)	H (2 df)	M (SD)	M (SD)	M (SD)	M (SD)	H (3 df)
BMI	18.22 (1.68)	18.12 (1.85)	19.04 (2.26)	3.44	21.83 (2.26)	20.16 (1.99)	21.43 (3.29)	19.94 (2.42)	11.84**
Self-esteem	4.60 (0.61)	4.42 (0.97)	4.82 (0.90)	5.71	5.21 (0.93)	4.52 (0.96)	4.98 (0.61)	4.64 (0.82)	12.92**
General BID	0.31 (0.86)	-0.89 (1.25)	-0.23 (0.94)	14.35***	-0.26 (0.81)	-0.84 (1.30)	0.27 (0.96)	-0.75 (1.34)	13.51**
Specific BID	0.08 (0.95)	-1.45 (1.32)	-0.72 (0.95)	16.99***	-0.58 (1.02)	-1.20 (1.04)	0.07 (1.03)	-1.00 (1.02)	16.59**
PressureThin	2.13 (0.51)	2.22 (0.67)	3.42 (0.75)	51.08***	2.68 (0.61)	2.40 (0.77)	2.79 (0.58)	3.02 (0.73)	19.67***
Soc. Support	2.78 (0.46)	2.67 (0.55)	1.94 (0.48)	39.34***	2.39 (0.59)	2.37 (0.65)	2.29 (0.48)	2.23 (0.56)	1.60
EDE-Q	0.46 (0.52)	1.54 (1.27)	0.69 (0.90)	19.44	0.56 (0.99)	1.80 (1.38)	0.34 (0.26)	1.30 (1.20)	28.12

\*\*\*Note. PressureThin = Pressure to be Thin; Soc. Support = Social Support; BID = Body Image Dissatisfaction; EDE-Q = EDE-Q Global Score.  
\*\* $p < .01$ ; \*\*\* $p < .001$

Among the gymnasts, non-elite males were significantly more satisfied with their body image than elite females (general BID  $U = 170.00$ ,  $z = -3.34$ ,  $p < .001$ ,  $r = -.41$ ; activity-specific BID  $U = 149.00$ ,  $z = -3.76$ ,  $p < .001$ ,  $r = -.47$ ) and non-elite females (general BID  $U = 212.00$ ,  $z = -2.78$ ,  $p < .01$ ,  $r = -.34$ ; activity-specific BID  $U = 193.50$ ,  $z = -3.12$ ,  $p < .01$ ,  $r = -.38$ ), but they reported similar levels of BID to elite males. Although most gymnasts reported the same value of BID on the two indicators, the Wilcoxon signed-rank test showed that when differences existed, elite males ( $T = 0$ ,  $z = -2.45$ ,  $p < .05$ ,  $r = -.40$ ), elite females ( $T = 3$ ,  $z = -3.14$ ,  $p < .01$ ,  $r = -.31$ ) and non-elite females ( $T = 6$ ,  $z = -2.21$ ,  $p < .05$ ,  $r = -.22$ ) were significantly more dissatisfied with their body images as gymnasts than with their overall images. The same was not true for male gymnasts from the non-elite group ( $T = 1$ ,  $z = -1.0$ ,  $p = .317$ ,  $r = -.18$ ), who revealed more similar ideal images.

### *Perceived Pressure to Be Thin And Social Support<sup>2</sup>*

In ballet dancers, significant differences between elite and non-elite groups were found regarding the perceived pressure to be thin and social support in dance schools. Elite males and elite females did not differ. Both elite males and elite females showed higher levels of pressure to be thin (elite males  $U = 43.00$ ,  $z = -4.72$ ,  $p < .001$ ,  $r = -.61$ ; elite females  $U = 284.50$ ,  $z = -6.64$ ,  $p < .001$ ,  $r = -.66$ ) and perceived lower levels of social support (elite males  $U = 64.50$ ,  $z = -4.33$ ,  $p < .001$ ,  $r = -.56$ ; elite females  $U = 422.00$ ,  $z = -5.69$ ,  $p < .001$ ,  $r = -.57$ ) than did the non-elite group. Among the gymnasts, elite females perceived greater pressure to be thin than both non-elite females ( $U = 664.00$ ,  $z = -4.26$ ,  $p < .001$ ,  $r = -.42$ ) and non-elite males ( $U = 236.50$ ,  $z = -2.16$ ,  $p < .0167$ ,  $r = -.27$ ), but they perceived pressure similar to elite males. There were no significant differences regarding the social support received in gymnastics clubs.

### *Disordered eating (DE)*

Among ballet dancers, elite females reported significantly greater DE than elite males ( $U = 146.50$ ,  $z = -3.19$ ,  $p < .001$ ,  $r = -.39$ ) and non-elite

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<sup>2</sup> The values of the variables pressure to be thin and social support must be interpreted in the opposite direction, i.e., the higher the result, the lower the perceived pressure to be thin and the lower the perception of social support.

females ( $U = 683.50, z = -3.89, p < .001, r = -.39$ ). However, elite male and non-elite female dancers did not differ regarding DE. As for gymnasts, elite females reported significantly higher DE than elite ( $U = 166.00, z = -4.09, p < .001, r = -.50$ ) and non-elite males ( $U = 105.50, z = -4.15, p < .001, r = -.52$ ), as well as non-elite females (elite males  $U = 266.00, z = -2.89, p < .01, r = -.35$ ; non-elite males  $U = 202.50, z = -2.76, p < .001, r = -.34$ ). Among gymnasts of the same sex, no significant differences were found between elite and non-elite groups.

## DISORDERED EATING PREDICTORS AMONG AESTHETIC PERFORMERS

### *General And Activity-Specific Body Image Dissatisfaction*

We tested the hypothesis that in aesthetic performers the discrepancy between the current body image and the ideal image for the practice of the activity is more relevant in the development of DE than the discrepancy with the ideal image in general. For each group of aesthetic performers, a usefulness analysis was performed (Darlington, 1968), which allows for a comparison of the change in  $R^2$  associated with a set of independent variables when the effects of other variables are controlled in the equation. Thus, we sought to test the incremental change in the explained variance in DE that is attributable to the activity-specific BID variable beyond the contribution of the control variables (sex, age, BMI and competitive level) and the general BID variable. Both independent variables (general and activity-specific BID) were introduced into the regression analysis in separate steps and in two possible orders to assess the unique variance explained by each of these independent variables on the dependent variable (DE). Two sets of usefulness analyses were conducted for each group of aesthetic performers. The control variables were entered in the first step, general BID in the second step, and activity-specific BID in the third step. In the second set of analyses, the control variables were entered in the first step, activity-specific BID in the second step and general BID in the third step. Among the gymnasts in the first set of analyses, activity-specific BID explained an extra 3% of the variance in DE ( $\Delta R^2 = 0.030, \Delta F = 7.23, p < .01$ ) beyond the contribution of general BID; in the second set of analyses, the incremental variance decreased greatly but was still significant ( $\Delta R^2 = 0.022, \Delta F = 5.30, p < .05$ ). However, among ballet dancers, the amount of unique variance explained by general BID was not significant anymore when entered subsequently to activity-specific BID ( $\Delta R^2 = 0.032, \Delta F = 6.50, p < .05; \Delta R^2 = 0.002, \Delta F = 0.43, p = .513$ ). In the following analysis, activity-specific BID was the only variable used

as a BID indicator, given the multicollinearity between the two indicators of BID (see Table II).

### *Individual And Contextual Variables For DE*

To understand which demographic, anthropometric and activity-related variables could be more relevant to control at Step 1 to make the model as parsimonious as possible, a multiple regression was performed with the following variables entered simultaneously: sex, age, BMI, activity and competitive level (the dichotomous variables were transformed into dummy variables). Age and activity were not significant predictors of DE among these aesthetic performers ( $p = .83$  and  $p = .63$ , respectively), so they were excluded from subsequent analysis.

At Step 1, the significant control variables from the previous analysis (sex, BMI and competitive level) were entered; the two individual variables that are well-established in the literature as predictors of DE (BID and self-esteem) and that were hypothesized as mediators were entered in the Step 2; in Step 3, the contextual variables of perceptions of pressure to be thin and social support were entered. The results are summarized in Table 3. The significance of sex, BMI and competitive level as predictors of DE was clearly diminished when self-esteem and BID were included in Step 2. The competitive level was no longer a predictor of DE when the contextual variables were taken into account in Step 3. Thus, the final model explained 56.4% of the variance in DE among aesthetic performers, to which the main contributors were high

TABLE II  
Correlations between All Study Variables (N = 249)

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Sex <sup>a</sup>	-									
2. Age	-.12	-								
3. BMI	-.21 <sup>**</sup>	.45 <sup>**</sup>	-							
4. Activity <sup>a</sup>	-.17 <sup>**</sup>	.17 <sup>**</sup>	.38 <sup>**</sup>	-						
5. Competitive Level <sup>a</sup>	-.14 <sup>*</sup>	.17 <sup>**</sup>	-.08	-.08	-					
6. Pressure to be Thin	.09	-.13 <sup>*</sup>	.09	.01	-.50 <sup>**</sup>	-				
7. Social Support	-.10	.19 <sup>**</sup>	.07	-.05	.35 <sup>**</sup>	-.41 <sup>**</sup>	-			
8. Self-esteem	-.17 <sup>**</sup>	-.05	-.14 <sup>*</sup>	-.05	-.11	.23 <sup>**</sup>	-.30 <sup>**</sup>	-		
9. General BID	-.25 <sup>**</sup>	-.26 <sup>**</sup>	-.38 <sup>**</sup>	-.06	-.12	.16 <sup>**</sup>	-.22 <sup>**</sup>	.34 <sup>**</sup>	-	
10. Specific BID	-.31 <sup>**</sup>	-.28 <sup>**</sup>	-.31 <sup>**</sup>	.02	-.15 <sup>**</sup>	.22 <sup>**</sup>	-.23 <sup>**</sup>	.38 <sup>**</sup>	.85 <sup>**</sup>	-
11. EDE-Q Global score	.28 <sup>**</sup>	.17 <sup>**</sup>	.26 <sup>**</sup>	.09	.20 <sup>**</sup>	-.32 <sup>**</sup>	.20 <sup>**</sup>	-.55 <sup>**</sup>	-.63 <sup>**</sup>	-.64

Note. <sup>a</sup>Dummy Variables coded 0 for Male, Ballet Dance and Non-elite, and 1 for Female, Gymnastics and Elite.

<sup>\*\*</sup> $p < .01$ , <sup>\*</sup> $p < .05$

BID ( $\beta = -.38, p < .001$ ) and lower self-esteem ( $\beta = -.34, p < .001$ ), followed by the perceived pressure to be thin ( $\beta = -.19, p < .001$ ), being female ( $\beta = .17, p < .01$ ) and a higher BMI ( $\beta = .16, p < .01$ ). The perception of social support and the competitive level did not prove to be significant predictors.

The variables that proved to be significant predictors were integrated into the subsequent study of the relation between the variables (including the mediator effects of BID and self-esteem, as previously proposed) through a model generation application of SEM (Kline, 2005).

### *Mediational Model In Aesthetic Performers*

Two measurement models were fitted to the data. In the one-factor model, all items loaded on one single latent variable. In the second measurement model, all observed items were grouped according to their respective latent variables (correlations among the latent variables were allowed). The one-factor model did not have a satisfactory fit [ $\chi^2(252) = 1487.99, p < .001$ ; SRMR = 0.14; IFI = 0.60; CFI = 0.60; RMSEA = 0.14]. The second measurement model, with four factors (replicating the underlying structure of the measures used), had a good fit, and this model fitted the data significantly better than the one-factor model [ $\chi^2(247) = 420.11, p < .001$ ; SRMR = 0.06; IFI = 0.94; CFI = 0.94; RMSEA = 0.05;  $\Delta\chi^2(5) = 1067.88, p < .001$ ].

To test the relations between the variables derived from the multiple regression analysis, a SEM model was fitted to the data. The model included a structural path from pressure to be thin to self-esteem and BID, as well as from

TABLE III

*Summary of Hierarchical Regression Analysis for Variables Predicting Aesthetic Performers Disordered Eating (N = 244)*

Variable	Model 1			Model 2			Model 3		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Sex <sup>a</sup>	1.24	0.18	.40***	0.47	0.16	.15**	0.53	0.16	.17**
BMI	0.17	0.03	.36***	0.06	0.02	.13**	0.08	0.02	.16**
Competitive Level <sup>a</sup>	0.64	0.14	.26***	0.30	0.11	.12**	0.16	0.12	.07
BID				-0.42	0.06	-.40***	-0.39	0.06	-.37***
Self-esteem				-0.47	0.06	-.35***	-0.45	0.06	-.34***
Pressure to be thin							-0.27	0.08	-.19**
Social Support							-0.16	0.10	-.08
R <sup>2</sup>		.26			.54			.56	
F for change in R <sup>2</sup>		27.54***			73.53***			6.49**	
$\Delta R^2$					.29			.02	
$\Delta F$					46.70			38.34	

Note. <sup>a</sup>Dummy Variables coded 0 for Male and Non-elite, and 1 for Female and Elite.

\*\*\*  $p < .001$ , \*\*  $p < .01$

self-esteem and BID to DE. The model fit the data quite well [ $\chi^2(309) = 507.4$ ,  $p < .001$ ; SRMR = 0.06; IFI = 0.94; CFI = 0.94; RMSEA = 0.05]. As expected, high levels of pressure to be thin were associated with low self-esteem ( $\beta = -0.47$ ,  $p < .001$ ) and high BID ( $\beta = 0.55$ ,  $p < .001$ ), which were both significantly associated with DE ( $\beta = -0.50$ ,  $p < .001$ ;  $\beta = -0.35$ ,  $p < .001$ , respectively).

To test the mediator effect of self-esteem and BID, a structural path was added to the previous model from pressure to be thin directly to DE. This new model (Figure 1) presents a significantly better fit [ $\chi^2(308) = 498.33$ ,  $p < .001$ ; SRMR = 0.06; IFI = 0.94; CFI = 0.94; RMSEA = 0.05;  $\Delta\chi^2(1) = 9.05$ ,  $p < .01$ ], supporting a partial mediation hypothesis. Effectively, higher pressure to be thin also significantly predicts DE ( $\beta = -0.30$ ,  $p < .01$ ). Each mediation analysis was tested further with the Sobel test. The results demonstrated that self-esteem ( $z = -3.20$ ,  $p < .01$ ) and BID ( $z = -3.35$ ,  $p < .001$ ) partially mediated the relationship between pressure to be thin and DE.

Thus, the amount of variance explained in DE (60.6%) by this model was in part attributed to three processes: a direct positive effect from pressure to be thin to DE; and two indirect effects from pressure to be thin to self-esteem and BID, which in turn were associated with higher DE.

## Discussion

The present study examined correlates of disordered eating in a sample of young aesthetic performers of both sexes and different competitive levels.

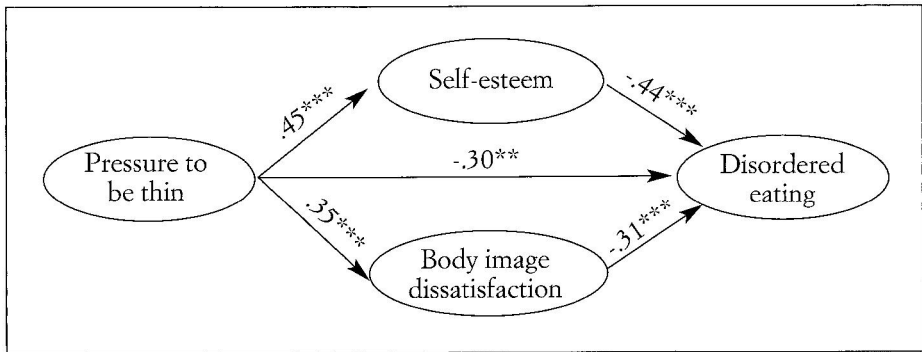


Fig. 1. - The structural model of the interrelationships between aesthetic performers' perceptions of pressure to be thin, self-esteem, body image dissatisfaction and disordered eating. Note. All coefficients presented are standardized and significant (\*\*\* $p < .001$ , \*\* $p < .01$ ).

Our first aim was to compare participants (grouped according to their specific activity – gymnastics or ballet dance) in terms of individual and contextual variables that were hypothesized as predictors of disordered eating. Some new findings are noteworthy. Among gymnasts, we found expected sex differences with large effects, regardless of the competitive level. The higher levels of DE in females than males are in accordance with results of different studies (e.g., Sundgot-Borgen & Torstveit, 2004). In contrast, the absence of differences in DE between the elite and non-elite groups of gymnasts (both female and male) was not expected (Byrne & McLean, 2002). This finding could be explained by the diversity of gymnastics disciplines included in the study because Nordin et al. (2003) found significantly higher eating disturbance and drive for thinness scores among rhythmic gymnasts than artistic gymnasts and sports acrobats. Future studies should investigate and compare larger samples of different disciplines to identify which of them constitute higher-risk groups for the development of eating disorders. Among ballet dancers, sex differences in DE only occur between elite female and male dancers. Both male and non-elite female dancers reported significantly lower DE levels than elite female dancers. The significant differences between elite male and female ballet dancers are in accordance with previous studies (e.g., Neumärker, Bettle, Dudeck, & Neumärker, 1998), but these results differ from the more recent study of Nordin-Bates et al. (2011) that found equal prevalence rates of disordered eating attitudes in both groups. Differences in sample characteristics may account for these differences because Nordin-Bates' sample was a group of young talented dancers focusing primarily on contemporary and mixed dance styles. Furthermore, our results for the elite and non-elite female dancers do not coincide with the findings of Doumenc et al. (2005), who found no differences among eating disorder levels between amateurs and professional ballet dancers. Future studies with larger samples (including non-dancers) should explore the hypothesis that the practice of recreational classical dance is protective against the development of eating disorders in young females.

In terms of the contextual variables studied (pressure to be thin and social support), the principal differences (and larger effects) were found among the ballet dancers. At the elite level, in both dance and gymnastics, there are no differences between males and females in perceived pressure to be thin. Differences in this variable are only found when comparing elite and non-elite groups. These findings support other studies that report high pressure from gymnastics coaches in the contexts of high level competitions and professional dance schools and link such pressure to an increased risk for the development of eating disorders (e.g., Kerr, et al., 2006; Toro, et al., 2009). However, similar



perceptions of pressure to be thin among both elite males and females is a new finding that reinforces the idea of a true contextual factor, which could be transversal to all the elite contexts in which aesthetic performers train or study. Specifically for ballet dancers, the differences in perceived pressure to be thin despite similar BMIs in all the three groups of ballet dancers may indicate that the pressure on dancers to lose weight or maintain a low weight is seen as “necessary” only in professional contexts and not in recreational settings where correspondence to the ballerina aesthetic ideal is less demanding. Regarding the other contextual variable, elite dancers reported less social support than non-elite dancers. Although social support was not strongly related to disordered eating ( $r < .30$ ), corroborating results for the general population (e.g., Byely, Archibald, Graber, & Brooks-Gunn, 2000), the perception of weak social support in professional dance schools — one of the main contexts in which elite ballet dancers grow and develop — may potentiate other negative experiences and outcomes, such as a less positive identity and burnout (Strachan, Côté, & Deakin, 2009). Specifically related to dancers, autonomy supportive training environments avoids burnout in elite dance settings (Quested & Duda, 2011a), as well as a mastery climate have a protective influence on disordered eating in female dancers (de Bruin, Bakker, & Oudejans, 2009). Additionally, because a recent study revealed that emotional support from parents and coaches was important for female collegiate athletes who recovered from an eating disorder (Arthur-Cameselle & Baltzell, 2012), this potential protective factor should be investigated in the future.

In the current study, few differences were found in self-esteem. Elite and non-elite aesthetic performers (ballet dancers or gymnasts) showed similar levels of self-esteem. When considering the sex of participants, it is interesting to observe that only the elite male gymnasts had significantly higher self-esteem than females (elite and non-elite). So few sex differences were not expected because, in general, boys present higher self-esteem than girls do (e.g., Azevedo & Faria, 2004). However, a study with young sports participants (competitive and recreational) showed that, despite males being more satisfied with the way they look, males and females were not significantly different with regard to global self-esteem (Bowker, Gadbois, & Cornock, 2003). Because self-esteem can also be domain-specific (Harter, 1999), future qualitative studies would be useful in understanding the domains of global self-esteem that better contribute to aesthetic performers feeling good about who they are and what they can do in all their individual roles and contexts.

Elite female dancers are significantly more dissatisfied with their body image than non-elite female dancers, a finding that contradicts the results of two published studies with professional and amateur dancers (Doumenc, et

al., 2005; Pollatou, et al., 2010). In contrast, the findings of higher body image satisfaction of elite male dancers in relation to their female counterparts and the absence of differences in BMI coincides with the findings of a study by Bettle et al. (1998). For gymnasts, levels of BID seem to be more similar, as only females (both elite and non-elite) present themselves as more dissatisfied than non-elite male gymnasts.

The use of an activity-specific BID indicator revealed interesting findings and stresses the need to distinguish between the two concepts of body image, as hypothesized. For example, among ballet dancers, male dancers and female non-elite dancers only differ in the activity-specific indicator of BID, reinforcing ballet's aesthetic ideal that a female dancer should be much thinner than a male dancer, as well as the aesthetic ideals of society in general. Overall, females seem to make a greater distinction between general and specific ideal body image because in every female group there are significant differences between the two indicators of BID, always showing more dissatisfaction with their image as athletes. Like de Bruin and colleagues (2007), and taking into account the mean values of general BID, we hypothesize that most female ballet dancers and gymnasts feel physically quite well and thin enough in their daily lives, but they believe they need to present a thinner body for the practice of classical dance and gymnastics to coincide with the aesthetic ideals they think would enable them to achieve more success. Among males, the two ideal images seem to co-exist more easily, reflecting the actual male aesthetic ideal of being lean and muscular (McCabe, Ricciardelli, & Finemore, 2002) because only the male elite gymnasts idealized an image specific to the practice of their activity that was significantly less heavy than the image of their daily life.

The second aim of this study was to explore possible predictors of disordered eating among aesthetic performers and to test a mediational model that includes the best predictors. The findings previously discussed about the two indicators of BID support the hypothesis and the results of the usefulness analysis, showing that activity-specific BID is a better predictor of DE than general BID. This was true especially for dancers because general BID does not explain significantly the variance in DE when activity-specific BID is taken into account. Thus, the assessment of aesthetic performers' BID (especially females) must consider these differences because the role of "gymnast" or "dancer" often becomes central to the lives of these young people, particularly at high competitive levels and during professional education, ruling many aspects of their life (Lopiano & Zotos, 1992).

In predicting disordered eating in aesthetic performers, we observed that variables such as sex, BMI and competitive level already explained 26% of the variance. Nevertheless, the individual and contextual variables in the

study were able to account for an additional 30% of the variance in DE. With respect to the contextual variables, unlike pressure to be thin, social support has not proved to be a contextual predictor for aesthetic performers' DE. An interesting finding from the hierarchical regression model is that, when the pressure to be thin was introduced into the model, the competitive level was no longer significant in predicting aesthetic performers' DE. As such, it is possible that, more than belonging to the elite group, it is the level of perceived pressure to be thin that increases the risk of DE. This idea should be investigated in future studies because of possible important implications for the prevention of DE. Our final SEM model explained almost 61% of the variance in aesthetic performers' DE and also confirmed the role of low self-esteem and specific body image dissatisfaction as partial mediators from pressure to be thin to DE. Thus, if aesthetic performers perceive pressure to remain thin in their environments, they are more likely to engage in unhealthy eating behaviors, especially if they also present low self-esteem and are dissatisfied with their body image in relation to their activity (both of which seem to be influenced by the perception of the pressure to be thin).

Our study has some limitations, namely the small size of the groups of male aesthetic performers and, specifically, the absence of a group of non-elite male ballet dancers, which is connected to the relatively lower level of participation of boys in classical dance. The cross-sectional design of the study does not allow for full comprehension of the relationship between participation in these activities and the development of disordered eating, which only longitudinal studies may clarify. The use of self-report questionnaires, and the fact that we have not taken into account the percentage of respondents and non-respondents, constitute limitations to our study and may have contributed to DE symptoms being underreported. As we know, athletes who have higher levels of disturbance prefer not to show it (not participating in research or denying some symptoms), even when anonymity conditions are guaranteed (Muscat & Long, 2008) as they were in this study. Finally, despite that the perception of pressure to be thin in the aesthetic performers' clubs or schools has been considered a good predictor of and correlates well with disordered eating, future studies should seek to evaluate the perceived pressure to be thin on the aesthetic performers. Specifically, it is important to distinguish between pressure on female and male aesthetic performers because a recent study showed a higher prevalence of male (vs. female) elite athletes who reported being on a diet ordered by their coaches (Martinsen, Bratland-Sanda, Eriksson, & Sundgot-Borgen, 2010).

In addition to contributing to the clarification of the specific risk factors for the development of disordered eating among aesthetic performers, our

findings, based on the model and suggestions of Petrie and Greenleaf (2007), also offer some clues to possible preventive actions. In our opinion, such preventative measures are essential in professional (but not recreational) dance schools and especially gymnastics clubs where elite gymnasts practice (and where gymnasts of other competitive levels frequently also train). On a more individual level, these actions should focus on promoting young aesthetic performers' self-esteem and satisfaction with their activity-specific body image, which is essential to reducing the impact of pressure to be thin on their eating and weight-control behaviors (Martinsen, et al., 2010; Petrie, Greenleaf, Reel, & Carter, 2009). Other agents in these contexts, mainly coaches and teachers, should also be the target of these actions. Specifically, coaches and teachers should understand the impact of their behaviors and comments that lead aesthetic performers to adopt unhealthy practices (Buchholz, et al., 2008; Kerr, et al., 2006) and should try to adjust their demands to healthier ideal body requirements for the practice of classical dance or gymnastics. Thus, in a recursive way, they will also contribute to the increase in aesthetic performers' satisfaction with their activity-specific body images, regarded as the strongest predictor of disordered eating in these adolescents.

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