

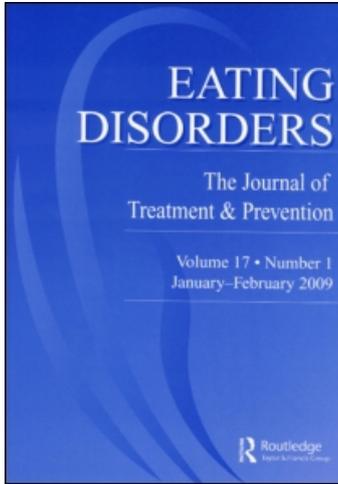
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Correlates of Disordered Eating Attitudes Among Male and Female Young Talented Dancers: Findings From the UK Centres for Advanced Training

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Correlates of disordered eating attitudes were examined with a mixed-sex sample of 347 young talented dancers aged 10–18 years from all UK Centres for Advanced Training. Equal proportions of females (7.3%) and males (7.6%) were symptomatic for disordered eating but correlates differed: for females, self-evaluative perfectionism, waking up > twice/night and hours of non-dance physical activity were predictive while for males, only the combination of self-evaluative and conscientious perfectionism was significant. Differences between menstrual status groups were evident, with young dancers (pre-menarcheal/within first year of menarche) reporting the least disordered eating attitudes and those with dysfunctional menses reporting the most.

Research typically reports higher rates of disordered eating among dancers than non-dancers (Garner & Garfinkel, 1980; Hamilton, Brooks-Gunn, & Warren, 1985; Ringham et al., 2006), although conflicting evidence does exist (Reel, SooHoo, Jamieson, & Gill, 2005; Schnitt, Schnitt, & Del A'Une, 1986; Toro, Guerrero, Sentis, Castro, & Puértolas, 2009). Studies have largely focused on classical ballet, and even within ballet, disordered eating has been reported at very different rates: for example, anorexia

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nervosa prevalence among female ballet dancers has been estimated at 1.6% (Abraham, 1996), 4.1% (le Grange, Tibbs, & Noakes, 1994), 6.5% (Garner & Garfinkel, 1980), 7.0% (Szmukler, Eisler, Gillies, & Hayward, 1985) and 25.7% (Garner, Garfinkel, Rockert, & Olmsted, 1987). In stark contrast, Ringham et al. reported that 83% of their sample of female ballet dancers had a lifetime incidence of some form of clinical eating disorder (Ringham et al., 2006). These inconsistencies, alongside the fact that most studies have focused on anorexia in ballet rather than disordered eating attitudes among dancers in a variety of styles, suggest that further research is warranted. Small-scale work performed some 30 years ago indicates that rates may be lower in modern dance than in ballet, and no different than the normal population (Schnitt et al., 1986). In the present study, we were interested in exploring this notion further.

In addition to being centered on ballet, the dance literature has focused largely on females (de Bruin, Bakker, & Oudejans, 2009; Garner & Garfinkel, 1980; Hamilton et al., 1985; Piran, 1999; Reel et al., 2005; Ringham et al., 2006; Schnitt et al., 1986; Szmukler et al., 1985; Thomas, Keel, & Heatherton, 2005; Toro et al., 2009), perhaps because higher incidences have been reported among females than males (e.g., Aimé, Craig, Pepler, Jiang, & Connolly, 2008; Button, Aldridge, & Palmer, 2008; Neumärker, Bettle, Bettle, Dudeck, & Neumärker, 1998). One of the few studies to examine disordered eating attitudes among both male and female dancers found that while both sexes reported more disordered eating attitudes than non-dancer controls, no males scored above clinical cut-off while 21.6% of females did so (Neumärker et al., 1998). Because menstrual dysfunction cannot be used as a warning sign of disordered eating among males, there is a need to establish their correlates and risk factors, and whether these are similar or different to those of females. Non-dance research indicates that many aspects of disordered eating are similar for both male and female sufferers, such as their clinical presentation (e.g., Button et al., 2008). Recently it also has been noted that although males with anorexia clearly do not suffer from amenorrhea, they are at an even greater risk of osteoporosis (Mehler, Sabel, Watson, & Andersen, 2008). Despite these similarities, the risk factors (Carlat, Camargo, & Herzog, 1997; Engel et al., 2003; Haase, Prapavessis, & Owens, 1999) and trajectories (Aimé et al., 2008) for eating disorders may differ between males and females. Aimé and colleagues (2008) reported that atypical eating behaviors among boys is particularly concerning, given that it appears to increase their risk for other psychological problems (e.g., depression, drug use). The primary aim of this study was to examine the prevalence of disordered eating attitudes among a sample of young talented dancers, including any potential differences between males and females.

It is well recognized that disordered eating most likely results from a combination of risk factors (e.g., Annus & Smith, 2008; Berry & Howe,

2000; Garner & Garfinkel, 1980; Thomas et al., 2005). These include environmental factors such as teacher and peer pressure (Berry & Howe, 2000; de Bruin, Oudejans, & Bakker, 2007; Garner & Garfinkel, 1980; Reel et al., 2005; Thomas et al., 2005; Toro et al., 2009) and individual factors. In the present paper, the focus is on individual risk factors.

Individual risk factors may be split into demographic, physical, training-specific, and personality variables. Two examples of personality variables include perfectionism and low self-esteem (e.g., Engel et al., 2003). Perfectionism is perhaps especially key; indeed, it has been found to constitute a risk factor in the *development* of eating problems (Tyrka, Waldron, Graber, & Brooks-Gunn, 2002) and is also conceptualized as an intrinsic *part* of eating disorders (Forsberg & Lock, 2006; Halmi et al., 2000). Despite such recognition, dance research in particular has tended to rely on unidimensional perfectionism measures. Research specifically focused on perfectionism, however, has clearly demonstrated that it is a multidimensional construct. For instance, Frost and his colleagues described perfectionism as involving the setting of high personal standards, a pervasive sense of not being good enough (concern over mistakes and doubts about actions), and as being closely associated with perceptions of high expectations and criticism from parents (Frost, Marten, Lahart, & Rosenblate, 1990). Sport researchers have sometimes split perfectionism into two aspects, one conceptualized as positive (i.e., striving high for positive outcomes) and the other as negative (i.e., striving to avoid negative outcomes, and experiencing great concern as a result; Terry-Short, Owens, Slade, & Dewey, 1995). Using this latter approach, Haase, Prapavessis, and Owens (2002) found that females reported more disturbed eating the higher their scores for negative perfectionism. By contrast, males reported less disturbed eating the higher their scores for positive perfectionism. To date, there is a lack of research examining how multidimensional perfectionism might be related to disordered eating attitudes among dancers. This is the second aim of the present study.

A new measure, the Perfectionism Inventory (PI; Hill et al., 2004), was used in this study. The PI makes a novel distinction between *conscientious perfectionism* (characterized by a striving for excellence, the setting of high standards for others, and being planful and highly organised) and *self-evaluative perfectionism* (characterized by concern over mistakes, rumination, need for approval, and the perception of pressure from significant others; Hill et al., 2004). As such, it bears some similarity to the positive-negative distinction studied by authors such as Haase et al. (2002). However, a recent study found that conscientious and self-evaluative perfectionism were highly linked, and that dancers with perfectionist tendencies scored highly on both aspects (Nordin-Bates, Cumming, Sharp, & Aways, 2011). Dancers who were more perfectionistic reported lower scores for self-confidence, greater anxiety, and more debilitating imagery experiences than

their non-perfectionist peers. Such findings suggest that it would be worthwhile to make a better delineation of whether particular components of perfectionism predict other problematic behaviors and cognitions, such as disordered eating attitudes, or whether it is perfectionism more generally.

In addition to perfectionism, self-esteem has sometimes been found to be predictive of disordered eating attitudes among dancers and athletes (Anshel, 2004; Engel et al., 2003; Petrie, Greenleaf, Reel, & Carter, 2009). Low self-esteem is typical of perfectionists (e.g., Gotwals, Dunn, & Wayment, 2003) but the relative importance of each variable is unclear. Berry and Howe (2000) found that although low self-esteem was related to restrained eating, it did not emerge as an independent predictor whereas body image, social pressure, and body mass index did. A later examination of disordered eating attitudes among athletes found self-esteem to be predictive while perfectionism was not (Petrie et al., 2009). The lack of research with dancers in this regard prompted the examination of both perfectionism and self-esteem as potential correlates of disordered eating attitudes.

As a third and final aim, the search for correlates of disordered eating attitudes was extended beyond the personality variables of perfectionism and self-esteem to include demographic, physical, and training-specific variables. Among the demographic variables, research indicates that age and ethnicity may be important. For instance, Hamilton et al. (1985) found that in a small sample of ballet dancers the prevalence of anorexic behaviors was 33% among White Americans, 47% among White Europeans, and 0% among Black Americans. By contrast, non-dance research suggests that non-White males report more indices of disordered eating attitudes than do White males (Ricciardelli, McCabe, Williams, & Thompson, 2007). Age has also been implicated, with rates found to be higher among older than younger teenage girls (e.g., Jones, Bennett, Olmsted, Lawson, & Rodin, 2001). Other research suggests that most adolescents do *not* usually develop eating problems during their teenage years and that most eating trajectories are stable over this time period (Aimé et al., 2008). Such inconsistencies regarding ethnicity and age warrant further research.

A physical factor related to age is maturation. Brooks-Gunn and Warren (1985) found that late maturing female dancers (those reaching menarche after age 14 yrs) both weighed less and were less likely to report disordered eating symptoms than their peers who matured early or on time. In an elite sample, Hamilton and colleagues found that dancers who dropped out of the School of American Ballet were more likely to have matured early or on time than the dancers who stayed in training; the former were also more likely to report eating disorder symptoms (Hamilton, Hamilton, Warren, Keller, & Molnar, 1997). Because disordered eating may, in turn, lead to menstrual dysfunction (Torstveit, Rosenvinge, & Sundgot-Borgen, 2008), age of menarche and menstrual dysfunction may be considered two of the physical factors associated with disordered eating for women. We

were especially interested in including these variables in this study because the late-maturing body is most coveted in ballet (e.g., Lowenkopf & Vincent, 1982; Schnitt et al., 1986); this study therefore aimed to extend existing literature by making use of a sample focused largely on contemporary and mixed dance styles.

Data for this study were collected as part of a wider project¹ which afforded us the possibility of examining whether a third physical variable, sleep quality, might also be related to disordered eating attitudes. Our rationale was that perfectionists tend to ruminate on their unrealistic goals and perceived failures (Hill et al., 2004) and may therefore find it difficult to sleep. Feeling hungry as a result of dietary restraint may logically also lead to sleep problems. If sleep quality were predictive of disordered eating attitudes, it could provide an uncontroversial warning sign that may be easier for dance educators to discuss with dancers than more sensitive issues such as menstrual dysfunction or eating behaviors.

Few studies have examined disordered eating prevalence in large samples of dancers ($N > 100$) and how it may relate to dance- and training-specific factors (Thomas et al., 2005). The present study aimed to address some of these shortcomings by examining training-specific factors such as training history (e.g., age at which dancing commenced, time in their current school) and training load (e.g., weekly hours spent on dance as well as non-dance physical activity each week). Excessive exercising is a well-known component of disordered eating, and McLaren and colleagues found that in a sample of female university students, excessive commitment to exercise was predictive of dietary restraint (McLaren, Gauvin, & White, 2001). This effect was over and above that of perfectionism. To our knowledge, the present study is the first to examine whether training-specific factors are indicative of disordered eating attitudes among dancers.

To accomplish our aims, we studied a sample of male and female young talented dancers participating in a new government-funded training scheme. This is important because the scheme has introduced a new model of pre-vocational training that is designed around mainstream schooling (i.e., it takes place primarily on weekends and sometimes on weekday evenings and holidays) and aims to take dancers' individual needs into account (including e.g., school workload, other forms of dance done in other schools) through individual training plans. All eight Centres for Advanced Training (CATs) participate in the research. Most CATs focus on contemporary forms of dance including various contemporary styles such as Cunningham and Limón, and creative workshops; one CAT is focused on

¹ The larger project is a 3-year interdisciplinary study with young dancers at the Centres for Advanced Training. Data presented here form part of the first of five data collections, performed in winter 2008–2009.

classical ballet, and two operate two-stranded centres. In one of these, students focus on contemporary or South Asian dance forms (Bharatnatyam or Kathak); in the other, contemporary or urban dance. Most participants thus obtain training with a contemporary focus, but it is notable that all CATs also deliver classical ballet. This format of training is different from other modes hitherto available to dancers of this age group, for whom choices were until recently largely restricted to vocational boarding ballet schools with a national or international recruitment, or local recreational dance classes.

In summary, the aim of the current investigation was to extend existing literature as regards correlates of disordered eating attitudes among young talented dancers. It is recognised that some factors (e.g., perfectionism) may *contribute* to disordered eating attitude development; by contrast, other factors are more likely to *result from it* (e.g., menstrual dysfunction). Nevertheless, all the factors studied were chosen as potential indicators or warning signs, because if particular factors were identified as correlates of disordered eating attitudes, they may perhaps be used preventively in the future as indicators of persons at risk.

METHODS

Participants

Participants were 347 dancers aged 10–18 years ($M = 14.44$, $SD = 2.10$). Approximately three quarters of the sample were female ($n = 261$) and one quarter were male ($n = 85$). One participant did not report their sex. Dancers had been in their CAT for an average of 13.33 months ($SD = 14.77$), but the range was wide (1–60 months); similarly, their total number of years in dance varied greatly (0.17–16 years; $M = 8.12$, $SD = 3.76$). At the time of the study, participants reported dancing for an average of 7.89 hours per week in their CAT ($SD = 3.29$), but again the range was wide (2–29 hours). Most also took dance classes outside the CAT ($M = 4.89$, $SD = 5.01$, range 0–35h). Finally, they reported an average of 3.68 hours ($SD = 3.15$, range 0–24h) of non-dance physical activity per week, such as sport, exercise, and supplementary practices (e.g., Pilates).

Materials

DEMOGRAPHIC INFORMATION

Participants provided a range of demographic information including age, sex, ethnicity, number of months of participation in a CAT, number of years in any type of dance, number of hours currently danced per week in a CAT as well as in other dance schools, and the number of hours of sport, exercise, and supplementary training.

DISORDERED EATING ATTITUDES

The Eating Attitudes Test (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982) is a questionnaire created to assess attitudes and behaviors related to the eating disorders anorexia nervosa and bulimia nervosa. It comprises three subscales: Dieting (e.g., “I am terrified about being overweight”), Bulimia and Food Preoccupation (e.g., “I have gone on eating binges where I feel that I may not be able to stop” and “I feel that food controls my life”), and Oral Control (e.g., “I avoid eating when I am hungry”). To complete the questionnaire, participants rate their agreement with 26 statements using the response options *Never*, *Rarely*, *Sometimes*, *Often*, *Very Often*, and *Always*. The first three options all yield a score of 0, while the latter three yield scores of 1, 2, and 3, respectively. Scores are then summed to obtain a total for each of three subscales as well as for the scale as a whole. Persons scoring over 20 should be referred for further investigation as they may have an eating disorder (Garner et al., 1982). Construct validity and internal consistency for the original EAT-40 were demonstrated by Garner and Garfinkel (1979) and for the EAT-26 by Garner et al. (1982). In the present study, Cronbach’s alpha values indicated that not all items were internally consistent within their subscales. Specifically, only the Dieting subscale yielded a good score ($\alpha = .83$) while the Bulimia and Food Preoccupation subscale required items 9 and 26 to be removed, and the Oral Control subscale required items 5, 15, and 19 to be removed; thereafter scores were acceptable ($\alpha = .65$ and $.69$, respectively). EAT Scores used to identify individuals at risk (i.e., scoring above 20) were computed using all items, while other analyses were performed with subscales and overall EAT totals comprising internally consistent items only.

PERFECTIONISM

The Perfectionism Inventory (PI; Hill et al., 2004) was used to capture the dancers’ perfectionist tendencies. The original PI comprises 59 items in 8 subscales: Striving for Excellence, Planfulness, High Standards for Others, Organization, Concern over Mistakes, Need for Approval, Parental Pressure, and Rumination. The first four subscales form the factor *conscientious perfectionism* and the latter four capture *self-evaluative perfectionism*. Validity and reliability for the PI has been established (Hill et al., 2004). A dance-specific version of the PI, used in a previous study (Nordin-Bates et al., 2011), was employed for the purposes of this study. Amendments include the dropping of the Organization subscale as it does not easily translate to dance, and changing references to “parents” to “teachers.” The dance specific PI therefore comprises 51 items falling into 7 subscales, with all items being rated on a Likert scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). For this study, all subscales were found to exhibit good internal consistency ($\alpha = .76-.87$).

SELF-ESTEEM

The Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) was used to capture the feelings and attitudes that the dancers have about themselves. It consists of ten items, each scored on a 4-point Likert scale ranging from 1 (*Strongly Disagree*) to 4 (*Strongly Agree*). The RSE has established validity and reliability (Blascovich & Tomaka, 1991).

MENSTRUAL HEALTH

Female dancers answered questions related to their menstrual history including whether periods had started (*yes/no*) and, if yes, at what age. If periods had started over a year ago, dancers also indicated the number of periods had over the previous 12 months (*0–3; 3–6; 6–9; 9–12; >12*). Regularity was captured through two items: whether they considered their periods regular (*yes/no*) and whether their periods had ever stopped for ≥ 3 months (*yes, that is happening now; yes, that has happened previously; no, never*). Finally, dancers were asked whether they were taking the oral contraceptive pill (*yes/no*).

SLEEP QUALITY

Dancers were asked to indicate their sleep quality via two items: *Do you often wake up more than 2 times during the night?* and *Do you often have trouble falling asleep?* Both were scored on a 4-point Likert scale ranging from 1 (*Never*) to 4 (*Very Often*).

Procedures

Participants completed the questionnaires as part of a larger study comprising questionnaires, a health and injury survey, and physical screening. The project was approved by an Ethical Review Board and all participants provided informed consent, with dancers under 16 years of age also providing consent from a parent or guardian. The CATs endorse and schedule time for research participation in the dancers' timetables, but taking part is voluntary and anonymous. Only when individuals score above 20 on the EAT-26 do their anonymous ID codes become traced to their name and a manager informed so that further action may be taken. This procedure is described in the information letters and part of the consent provided by participants and parents.

RESULTS

Data were first screened for inputting errors, normality, and outliers. It was found that while most scores exhibited reasonable normality, EAT-26 scores

were non-normally distributed. This is unsurprising given that three out of six response options yield a score of 0, and that all other scores are indicative of problematic attitudes; as such, one would expect a distribution where most scores cluster around 0 and taper off toward the highest score of 3. While many studies in the field appear to use the EAT scores in their original format, others have employed a log10 transformation; this was applied to our data, and the distribution subsequently improved.

Total EAT scores were computed and dancers scoring above 20 identified as symptomatic for an eating disorder (Garner et al., 1982); 24 dancers were identified in this manner, with equal prevalence among females (7.3%) and males (7.6%). These scores were computed with the original EAT-26 scores in order to find scores above 20 (i.e., clinical cut off); all analyses from here forward, however, were computed with log10-transformed EAT subscales and total scores. Ethnicities of dancers in the symptomatic group largely mirrored the distribution of the sample at large, with 75% being White British (whole sample: 76.4%), 10% being mixed Black and White (5.8%), 5% Black (3.9%) and 10% Asian British (5%).

Next, descriptive data and bivariate correlations were calculated for all variables of interest; this was done separately for males and females. Because the two questions about sleep correlated only moderately ($r = .41$, $p < .01$), they were kept separate rather than averaged. Descriptive data are illustrated in Table 1 while the correlation matrices are displayed in Table 2 (Females) and Table 3 (Males). Correlations will not be additionally reported here, but it is notable that the two forms of perfectionism were fairly strongly correlated ($r = .56$ for females, $r = .50$ for males; both $p < .01$), suggesting that the two constructs are highly related, yet distinct. Of additional interest is that age of menarche was uncorrelated with all constructs of interest, which may be due to the fact that in this sample, nearly 90% of our sample matured on time (that is, between age 11 and 14; Brooks-Gunn & Warren, 1985).

The results suggested that the variables associated with disordered eating attitudes differed between females and males. To examine this in better detail, two regressions (one for males and one for females) were performed to examine which variables would best predict disordered eating attitudes. The results of these regressions are reported in Table 4. The models specified differed for males and females based on the bivariate correlations reported above. For females a hierarchical regression was used in order to examine whether the psychological variables added significant predictive value above and beyond the demographic variables (given that these were in several cases correlated). As such, demographic variables (age, hours of non-dance physical activity) were entered on the first step and other possible predictors (perfectionism constructs, self-esteem, sleep scores) were entered on step two. Four cases were deleted due to high Mahalanobis distance values.

TABLE 1 Descriptive Information, Including Demographics and Questionnaire Scores

	Females (<i>n</i> = 261)		Males (<i>n</i> = 85)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Demographics				
Age (years)	14.51	2.03	14.19	2.29
Months in CAT	13.39	14.63	13.12	15.37
Years in dance	8.88	3.54	5.45	3.28
Hours in CAT/week	7.79	2.88	8.20	4.39
Hours other dance/week	5.15	5.23	3.93	4.04
Hours non-dance physical activity/week	3.42	2.84	4.59	3.94
Age of menarche (years)	12.62	1.30		
EAT-26				
Dieting	3.70	5.23	3.35	5.75
Bulimia and food preoccupation	0.61	1.47	0.52	1.53
Oral control	0.72	1.78	0.78	1.67
Total	4.99	6.81	4.61	7.56
Perfectionism inventory				
Conscientious	9.33	1.56	9.21	1.67
Self-evaluative	11.41	2.68	11.61	2.80
Self-esteem	30.24	4.03	31.12	4.15
Sleep quality				
Trouble falling asleep	2.00	0.80	2.10	0.92
Waking up > twice per night	1.65	0.73	1.63	0.76

Note. CAT = Centre for Advanced Training and EAT-26 = Eating Attitudes Test – 26. EAT-26 scores reported here are calculated with internally consistent items only using non-transformed scores for ease of interpretation.

The overall model was significant, $F(7, 185) = 7.31, p < .01$, and both steps represented significant F-changes. Step one predicted just 4.5% of the variance in disordered eating attitudes while the second step added 17.8% of unique variance, a significant increment. From step 1 only hours of non-dance physical activity was a significant predictor. From step 2, waking up more than twice per night and self-evaluative perfectionism emerged as additional, significant, independent predictors.

For males, only the two perfectionism constructs were used as predictor variables and a simple linear regression was employed. No cases exceeded the critical Mahalanobis distance value. The overall model was significant, $F(2, 62) = 3.40, p < .05$ and together, the independent variables predicted 10.2% of the variance in disordered eating attitudes. Neither form of perfectionism emerged as a significant independent predictor, suggesting that the shared variance between the two constructs is most related to disordered eating attitudes.

Female dancers were thereafter grouped into broad categories based on their menstrual status, broadly based on the procedures used in research with elite athletes (Torstveit & Sundgot-Borgen, 2005a) but defining primary

TABLE 2 Correlations Between Key Study Variables for Female Dancers

	1	2	3	4	5	6	7	8	9	10	11	12
1) Total EAT-26												
2) Age	.14*											
3) Years in dance	-.06	.47**										
4) Months in CAT	.02	.26**	.22**									
5) Hours in CAT/week	.00	-.04	-.05	.51**								
6) Hours other dance/week	.08	.26**	.16*	-.10	-.25**							
7) Hours non-dance physical activity/week	.16*	-.16*	-.18**	-.07	.04	-.06						
8) Self-evaluative perfectionism	.42**	.34**	.06	.09	-.10	.06	-.01					
9) Conscientious perfectionism	.27**	.28**	.09	.05	-.13	.23**	-.05	.56**				
10) Self-esteem	-.32**	-.31**	.03	-.17*	-.00	-.10	.00	-.57**	-.26**			
11) Wake up > twice per night	.30**	.02	.01	.02	-.02	.01	.00	.30**	.10	-.27**		
12) Trouble falling asleep	.16*	.05	-.06	.06	-.12	.05	-.01	.31**	.21**	-.21**	.40**	
13) Age of menarche	-.05	.18	.08	.16*	-.07	.03	-.04	-.02	-.08	.06	-.09	.03

Note: CAT = Centre for Advanced Training and EAT-26 = Eating Attitudes Test - 26. *indicates $p < .05$, **indicates $p < .01$. Total EAT-26 score is \log_{10} transformed.

TABLE 3 Correlations Between Key Study Variables for Male Dancers

	1	2	3	4	5	6	7	8	9	10	11
1) Total EAT-26											
2) Age	-.20										
3) Years in dance	-.16	.35**									
4) Months in CAT	-.16	.29*	.43**								
5) Hours in CAT/week	-.04	.08	.26*	.54**							
6) Hours other dance/week	.11	.32*	.19	-.14	-.26*						
7) Hours non-dance physical activity/week	.13	-.24	-.22	-.32*	-.20	-.07					
8) Self-evaluative perfectionism	.31*	.26*	-.01	-.05	.00	-.01	-.06				
9) Conscientious perfectionism	.24*	.19	-.04	.18	-.01	-.01	-.30*	.50**			
10) Self-esteem	-.16	-.20	.16	.18*	-.01	-.08	.06	-.44**	-.01		
11) Wake up > twice per night	.20	-.11	.01	.05	.14	.04	.11	-.08	-.02	-.23	
12) Trouble falling asleep	.19	-.02	.05	.09	.19	-.02	-.01	.17	.09	-.18	.47**

Note: CAT = Centre for Advanced Training and EAT-26 = Eating Attitudes Test - 26. *indicates $p < .05$, **indicates $p < .01$. Total EAT-26 score is \log_{10} -transformed.

TABLE 4 Results From Regression Analyses Predicting Disordered Eating Attitudes

Predictor variables	B	SEB	B	<i>t</i>	R ²	ΔR ²	ΔF	<i>p</i>
Females								
<i>Step 1</i>								
Age	.00	.02	.02	.24	.05	.05	4.31	.02
Hours of non-dance physical activity	.02	.01	.15	2.17				.03
<i>Step 2</i>								
Trouble falling asleep	-.02	.04	-.04	-.54	.22	.18	8.17	.00
Waking up > twice per night	.10	.05	.17	2.29				.02
Self-esteem	-.01	.01	-.12	-1.45				.15
Conscientious perfectionism	.04	.02	.13	1.60				.11
Self-evaluative perfectionism	.04	.02	.23	2.35				.02
Males								
<i>Model</i>								
Conscientious perfectionism	.04	.04	.13	.88	.10	.10	3.40	.04
Self-evaluative perfectionism	.04	.02	.24	1.64				.11

Note. B and SEB [Standard Error B] are unstandardized coefficients; β is the standardized coefficient. *P*-values for steps 1 and 2 refer to whether these steps represented significant *F*-changes; *p*-values for each variable refer to whether these represented significant, independent predictors (β coefficients).

amenorrhea as the absence of menses by age 15, in line with definitions from the American College of Sports Medicine (Nattiv et al., 2007). Dancers taking the oral contraceptive pill were excluded. Consequently, the *Functional* group comprised dancers who were eumenorrheic and reported regular menses (46.7%). The *dysfunctional* group included those reporting primary or secondary amenorrhea, irregular menses, previous dysfunction, or having had more than 12 periods in the last 12 months (24.0%). Finally, the *Young* group included those who were pre-menarcheal (i.e., not yet started periods and under 15 years of age) or within their first year of menarche (29.3%). These groups were used as the between-participant independent variable in a MANOVA where scores on the EAT subscales were the dependent variables. A significant multivariate effect was found, Pillai's trace = .11, $F(6, 398) = 3.85, p < .01$, partial $\eta^2 = .06$. Tests of between-group effects indicated significant differences between menstrual status groups for Dieting Behavior, $F(2, 200) = 4.77, p < .01$ and for Bulimia and Food Preoccupation, $F(2, 200) = 9.52, p < .01$, but not for Oral Control, $F(2, 200) = .76, p = ns$. Tukey post-hoc tests indicated that for Dieting behaviors, *Young* dancers scored significantly lower than the *Dysfunctional* group ($p < .01$), while the *Functional* group did not differ significantly from either the *Young* or the *Dysfunctional* groups. For Bulimia and Food Preoccupation, *Young* dancers

again scored significantly lower than the *Dysfunctional* group ($p < .01$), and scores for the *Functional* group were significantly lower than those of the *Dysfunctional* group ($p < .05$). *Young* and *Functional* groups did not differ.

DISCUSSION

The present study examined correlates of disordered eating attitudes in a unique sample of young talented dancers in a new pre-vocational training scheme. Our first aim was to establish prevalence and whether this differed between females and males. It was found that both males and females reported prevalence rates around 7.5%. This is a novel finding, because typically rates are found to be far higher among females (e.g., Aimé et al., 2008; Button et al., 2008; Neumärker et al., 1998). The prevalence of disordered eating attitude scores above cut-off were greater than those reported in some studies (Abraham, 1996; Garner & Garfinkel, 1980; le Grange et al., 1994; Szumukler et al., 1985) and lower than others (Garner et al., 1987; Hamilton et al., 1985; Schnitt et al., 1986). Differences in sample characteristics, scoring procedures and cut-offs used likely account for some of these differences. As noted by Toro et al. (2009), some variation is also likely due to a variety of factors specific to each dance environment, including selection procedures and pressures during training. For instance, given that there are many more females than males in dance, females may feel under greater pressure to conform to a specific body stereotype. Most studies have focused on classical ballet and ours is the first to examine the prevalence among a representative group of young talented dancers focusing primarily on contemporary and mixed dance styles. These styles are generally thought to be more inclusive and have no single ideal body type or shape. Only two studies report lower rates of dancers scoring above cut-off than non-dancers—and both examined dancers training in modern dance (Reel et al., 2005) or in mixed styles (Toro et al., 2009) rather than ballet. The latter study was also one of few to be performed in a non-Anglocentric culture (Spain). The generally high prevalence in their study might therefore be related to culture more generally than being specific to the dance setting examined. It is perhaps also notable that our prevalence rates were considerably lower than those reported in a Canadian non-dance community sample (27% among girls aged 12–18; Jones et al., 2001), suggesting that the role of the dance environment needs to be further examined. Environmental variables such as the motivational climate (de Bruin et al., 2009) and peer and teacher pressure (Berry & Howe, 2000; de Bruin et al., 2007; Garner & Garfinkel, 1980; Reel et al., 2005; Thomas et al., 2005; Toro et al., 2009) have been related to disordered eating attitudes, and a prevention program in an elite dance school focused on environmental change has been shown to be successful (Piran, 1999).

The dance environment may also influence dancers' perfectionistic tendencies (Carr & Wyon, 2003), and our second aim was to establish whether, and how, conscientious and self-evaluative perfectionism related to disordered eating attitude scores. It was found that self-evaluative perfectionism positively predicted disordered eating attitudes among females, while conscientious perfectionism did not. By contrast, perfectionism in general was a predictor for males, but neither perfectionism type emerged as an independent predictor. Thus, it appears that the shared variance between conscientious and self-evaluative perfectionism is large enough to warrant warning about perfectionism in general, but that the self-evaluative aspects of perfectionism are perhaps especially detrimental. Our finding for males therefore contradicts that of Haase and colleagues (2002), who found that male athletes' disordered eating attitudes were *negatively* predicted by their *positive* perfectionism—in other words, while one form of the trait appeared to put the athletes at risk, the more positive form appeared to reduce their susceptibility. Findings also differ from a recent study with athletes where self-esteem was predictive of disordered eating attitudes while perfectionism was not (Petrie et al., 2009). These studies are not directly comparable due to the disparity of measurement methods for both perfectionism and eating attitudes, as well as sample characteristics. But while further research is required to draw any firm conclusions, it seems safe to recommend that educators in dance and sport should look out for, and work to prevent, the self-evaluative, more “negative” side of perfectionism among both male and female performers. Due to the positive and relatively strong correlations between the subscales, perfectionism should perhaps be of concern more generally because those appearing to strive for perfection may well also suffer from the other components of perfectionism (i.e., the self-evaluative components).

The relationship between perfectionist tendencies and disordered eating is especially likely to emerge during times of stress; that is, a desire to become more “perfect” may translate into unhealthy weight-loss methods and cognitions when pressure is high and stress emerges (Ruggiero, Levi, Ciuna, & Sassaroli, 2003; Sassaroli & Ruggiero, 2005). While our study is not designed to examine stress specifically, later data collections will take place around times of performance which may result in higher scores, or more significant relationships between variables. We would suggest that dancers, schools, parents, and peers should be extra watchful during such stressful times, and that future studies take timing into account.

It was found that perfectionism and self-esteem were negatively correlated, and again self-evaluative perfectionism displayed the strongest relationship. Conscientious perfectionism and self-esteem were moderately related for females, and not at all for males. For females, there was also a negative association between self-esteem and disordered eating attitudes, while no such relationship existed for males. These results extend findings

from previous research (Engel et al., 2003; Petrie et al., 2009) indicating that low self-esteem plays a part in disordered eating attitudes, but also suggests that the relationship may differ depending on the sex of the performer. Moreover, self-esteem did not emerge as an independent predictor of disordered eating attitudes for either males or females, indicating that there is a great deal of shared variance between self-esteem and perfectionism; that is, perfectionism may be the stronger predictor of disordered eating attitudes but perfectionistic dancers also likely suffer from low self-esteem.

Although not part of our study aim, positive correlations between perfectionism and age were noted. These hint that while perfectionism is considered a personality trait (and therefore difficult to alter), it may develop during the adolescent years—during which dancers' training also typically intensifies. Indeed, Carr and Wyon (2003) found relationships between the motivational climate and dancers' perfectionism. Future analysis of our longitudinal data will help illuminate whether perfectionism develops over time, and whether this contributes to the prediction of disordered eating risk.

A third and final aim of this study was to extend the search for correlates of disordered eating attitudes beyond the personality variables of perfectionism and self-esteem to include demographic, physical, and training-specific variables. For males, none of the variables studied emerged as independent predictors. This suggests that particular vigilance is required as to the emergence of disordered eating attitudes among male dancers, because the risk factors and symptoms (and thus, warning signs) are not well understood for this population. Future research is required to better establish what these might be and how they may be prevented as well as dealt with if they do arise.

For females, three further variables could be considered indicative of disordered eating attitudes: the physical variables of sleep quality and menstrual status, and the training-specific variable of non-dance physical activity. Neither of the demographic variables studied (age and ethnicity) appeared to play a role. Moreover, the female dancers had largely reached on-time menarche which perhaps explained why age of maturation did not correlate with disordered eating attitudes or any of the other study variables.

The small correlation between age and EAT scores for females and lack of any such relationship for males is somewhat concordant with recent findings that most eating trajectories are stable over the teenage years (Aimé et al., 2008), but contrasts research suggesting a positive relationship between age and disordered eating attitudes (e.g., Jones et al., 2001; Monsma & Malina, 2004). As a physical factor related to age, we examined age of menarche for girls. Again contrasting certain earlier findings (Brooks-Gunn & Warren, 1985), it was revealed that no association existed between menarcheal age and disordered eating attitudes. In fact, nearly 90% of our sample reported having matured on time (i.e., between the ages of

11 and 14 years). Of course, the menarcheal age variable does not account for dancers reporting primary amenorrhea, given that they would not have reported their age of menarche; nevertheless, only two dancers actually suffered from this condition. The average age of menarche (12.62 years) also appears normal and seemingly lower than that reported for a large sample of dancers from a mixture of styles but doing at least 2 hours of ballet weekly (13.1 years; Steinberg et al., 2008), elite ballet students (13.0 years for dropouts and 14.1 years for adherers; Hamilton et al., 1997) and that reported for elite aesthetic athletes (14.0 years; Torstveit & Sundgot-Borgen, 2005b).

Despite the seemingly normal menstrual histories of the present sample, differences were found between menstrual status groups as regards disordered eating attitudes including Dieting Behaviors and Bulimia and Food Preoccupation. In particular, it is noteworthy that dancers who were either pre-menarcheal or within their first year of menarche reported less dieting and less bulimic/food preoccupied behaviors compared to dancers with dysfunctional menses. Dancers with functional menses also reported less bulimic/food preoccupied behaviors compared to dancers with dysfunctional menses, but not for the other two EAT-26 subscales. It is possible that Bulimia and Food Preoccupation resulted in dysfunctional periods (e.g., Austin et al., 2008). Altogether, the least sexually mature dancers were least likely to report disordered eating attitudes, which builds on previous research (e.g., Hamilton et al., 1997). At the same time, it is recognized that menstrual dysfunction may well be a consequence of dietary restraint, rather than a lack of maturation somehow holding disordered eating at bay. Whichever way around the relationship, we believe that the recommendation made by Torstveit et al. (2008) for athletes that menstrual dysfunction should be a component of screening applies also in dance. Such screening should help identify dancers with inadequate nutritional intakes, including those with disordered eating attitudes, and we have consequently included it in our work.

Due to the finding that exercising outside of dance was associated with disordered eating attitudes, dance educators may want to “keep an eye” on the exercise behaviors of their students. Indeed, exercising may well increase in the early stages of eating disorder development and/or be associated with the phase of greatest weight loss (Davis et al., 1997). Monitoring dancers’ exercise habits can be difficult, however—not least because dancers are often advised to undertake supplementary fitness training as a result of dance classes not being of sufficient intensity to reach cardiovascular benefits (Wyon, Abt, Redding, Head, & Sharp, 2004). Despite such difficulties, we believe that the individualized training plans made for each CAT student will go some way toward monitoring exercise levels.

There are several differences between our results and those of previous studies into disordered eating attitudes in dance. These include the equal

percentages of males and females scoring above cut-off and the lack of meaningful relationships between disordered eating attitudes and both age and menarcheal age found in this study. It is possible that these differences are due to differences between the typically small female ballet samples of previous research and our larger sample of mixed-sex, mixed-style dancers. Indeed, it has been suggested that the pressures for an ultra-thin body are at their highest in ballet (e.g., Lowenkopf & Vincent, 1982; Schnitt et al., 1986) and it is encouraging that contemporary as well as South Asian and urban dance styles seem to take a more inclusive approach, with varying shapes and sizes being seen not just in the CATs but also on the world stages.

Despite such positive attitudes, disordered eating attitudes still exist in the settings studied, and are far from fully understood. For now, our results imply that dance educators should be mindful that disordered eating attitudes exist among young males as well as females. It is also notable that the risk factors, indicators, and/or symptoms of such attitudes may differ between young men and women. Specifically, this study found that significant predictors of disordered eating attitudes among young females included self-evaluative perfectionism, sleep quality, and hours spent in non-dance physical activity. Moreover, among females who report having some form of menstrual disturbance (whether present or past), disordered eating attitude scores are greater than they are for females with functional menses and for young dancers who are either pre-menarcheal or within the first year of commencing menstruation. Among young males, menstrual status naturally cannot be used as an indication of disordered eating attitudes and thus other signs or risk factors must be identified. This is especially important because of the shortage of research into disordered eating attitudes among males.

Clearly, the range of factors studied here cannot account for more than a portion of the variance in disordered eating attitudes scores. As for other risk factors, studies have proposed a wide range. Body Mass Index (BMI) is one such factor that is commonly considered. For example, Haase and colleagues found that relations between negative perfectionism and disturbed eating attitudes were strongest for female lightweight rowers with higher body mass index (BMI) scores (Haase et al., 1999). Other studies have similarly indicated that BMI is related to disordered eating attitudes (Monsma & Malina, 2004), but here temporality is an important consideration: certain variables may be risk factors and precede the development of any problems (e.g., high BMI), while other variables may be indicators of an already present disorder (e.g., low BMI). In the present study, the cross-sectional nature of the design meant that data were not examined causally; instead, the focus was simply on correlates of disordered eating attitudes that may be used as indicators in applied dance settings. Perhaps interestingly, the CATs with whom this research took place do not allow weighing as this

is seen as controversial and potentially stressful for the dancers. As a result, it is unknown whether BMI would be predictive of disordered eating attitudes in the present cohort. Although the lack of this information presents a limitation to the research, it does indicate that CATs take a strong stand against the traditional weighing practices common to the elite dance training of the past.

Another limitation of our work relates to the self-report nature of the constructs. Neumärker et al. (1998) suspected that the high scores obtained for many of their female ballet dancer participants were “false positives”; by contrast, Torstveit and colleagues (2008) have reported evidence that self-report studies almost always under-estimate the true prevalence of eating disorders in at-risk populations such as the present one. While by no means perfect, the self-report format does allow for our data collections to take place twice yearly for 2 years; something that would be impossible if using clinical interview.

Future studies should endeavor to examine an even wider range of potential predictors of disordered eating attitudes, and do so longitudinally where possible (Reel et al., 2005). In addition to BMI, variables that were not considered in the present study but that have been suggested or shown to be important elsewhere include physical self-perceptions (Monsma & Malina, 2004), the motivational climate (de Bruin et al., 2009), sexual orientation, and possible victimization as a result of being “different” (Aimé et al., 2008; Carlat et al., 1997)—for example, homosexual boys in dance may be at particular risk.

Based on our findings, recommendations are centered on individual-level variables that may be seen as risk factors or indicators of disordered eating attitudes. These findings have been integrated into a nation-wide policy for the prevention, identification, and positive action regarding disordered eating attitudes in the CATs. Aside from individual-level variables, however, we firmly believe that school culture is a crucial aspect to consider and recommend further research, including intervention programs, around prevention focused on varying degrees of environmental/systemic and individual-level variables. As recommended by Piran, changes in school settings need to be systemic and not only work at the individual level (Piran, 1999).

In conclusion, correlates of disordered eating attitudes that may be used as health warnings for young dancers include perfectionism (especially if self-evaluative in nature) and, for females, excessive exercising outside of dance, sleep disturbances, and menstrual dysfunction. Future research into disordered eating in dance should include males to a greater extent than has hitherto been the case, so that the prevention of disordered eating can become truly evidence-based and ever more effective, especially as the numbers of boys and men in dance increase.

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