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1 Running head: CONSEQUENCES OF DISORDERED EATING ATTITUDES

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3 Psychosocial Consequences of Disordered Eating Attitudes in Elite Female Figure Skaters

4

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1 Abstract

2 The purpose of this study was to test a model of the effects of athletes' eating  
3 disorders on coach, sport friend, and parent social relationships and peer social  
4 acceptance through physical self-perceptions (i.e., perceived physical appearance and  
5 perceived physical ability). The sample comprised 199 elite female figure skaters. The  
6 data were analyzed using structural equation modeling.

7 Our results showed that the effects of athletes' eating disorders on social  
8 relationships were not mediated by physical self-perceptions. Athletes' eating disorders  
9 directly negatively influenced the quality of the parent-athlete relationship, thus  
10 confirming previous findings in young adults (Striegel-Moore et al., 2003). Contrary to  
11 the literature, eating disorders were positively related to perceived physical ability. This  
12 paradoxical finding is discussed in relation to achievement theories and the particularity  
13 of the sport context.

14

15 Keywords: Social relationships, peer acceptance, physical self-perceptions, disordered  
16 eating attitudes, elite sport.

17

1     *Psychosocial Consequences of Disordered Eating Attitudes in Elite Female Figure*

2   *Skaters*

3             The term “disordered eating attitudes” describes unhealthy attitudes and behaviors  
4     that range from strict dietary habits in order to lose or maintain weight to severe food  
5     restriction (Hobart & Smucker, 2000). In the psychosocial literature, they are generally  
6     considered to be sub-clinical (Petrie & Greenleaf, 2007), and diagnosis is based on self-  
7     report instruments. The adolescent period is propitious for the development of  
8     disordered eating attitudes, and young athletes appear to be particularly at risk (Petrie  
9     & Greenleaf, 2007).

10            Social and sport psychologists have conducted several studies that explain the  
11     personal and contextual factors and interactions that govern disordered eating attitudes  
12     (DEA; e.g., Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004; see Petrie &  
13     Greenleaf, 2007 for a review). In the late 1990s, Thompson, Coovert and Stormer  
14     (1999) examined a tripartite theoretical model of the psychosocial factors that would  
15     influence DEA in community adolescent girls. They concluded that peers, parents, and  
16     media would have: (a) a direct effect on the specific psychological variables of DEA,  
17     and (b) an indirect effect on DEA through two mediational processes: internalization of  
18     societal standards of appearance, and excessive appearance comparison. These authors  
19     also suggested a need for observing the converse effects; that is, the influence of DEA  
20     on social relationships. However, to date, no study has specifically focused on this  
21     direction of that relationship.

22            In the sport domain, psychosocial factors are also commonly cited as risk factors  
23     for the development of DEA in elite adolescent female athletes. For example,  
24     intrapersonal factors such as self-esteem, perfectionism, motivation, and coaching style

1 were examined in many studies (see Petrie & Greenleaf, 2007, for a review). In the  
2 sport context and particularly in aesthetic sports, self-esteem includes perceived  
3 physical ability and perceived physical appearance, both of which are considered as  
4 predictive factors of DEA (e.g., Ferrand, Magnan, & Antonini Philippe, 2005; Petrie &  
5 Greenleaf, 2007). Adolescent athletes with low self-esteem thus often have a negative  
6 body image and are preoccupied with weight and appearance. However, Scoffier,  
7 Maïano and d'Arripe-Longueville (2010) found inconsistent results concerning the  
8 relationship between the physical self-perceptions and DEA. They showed that  
9 perceived physical ability was a risk factor for developing DEA in elite aesthetic sports,  
10 while perceived physical appearance did not influence this development.

11 The influences of interpersonal factors have also been studied (e.g., Keer,  
12 Berman, De Souza 2006; Scoffier et al., 2009a). Indeed, elite female athletes interact  
13 with their peers and parents but perhaps most intensively and extensively with their  
14 coach. However, attachment theory (Kenny & Hart, 1992) suggests that parent  
15 relationships are the most concerned by the health and the integrity of their child,  
16 whereas the coach is particularly preoccupied by performance (Sundgot-Borgen, 1994).  
17 Thus, as girls or women, these athletes may feel under pressure to conform to the social  
18 norms of thinness but, as athletes, they may experience the additional pressure of  
19 keeping body weight low in order to achieve an aesthetically pleasing appearance and  
20 to gain the coach's approval (Nordin, Harris, & Cumming, 2003; Sundgot-Borgen,  
21 1994). The sport psychology literature thus provides insight into how the social  
22 environment of sports influences the development of DEA, but no study has yet  
23 examined how DEA, once developed, affect the quality of social relationships.

1           Although some psychological consequences of DEA (e.g., depression, anxiety,  
2 self-esteem) have been reported (e.g., Bulik, 2002, Bulik, Beidel, Duckmann, Weltzin,  
3 & Kaye, 1981; Evans & Wertheim, 1998, 2006; Grubb, Seller, & Waligorski, 1993;  
4 Hesse-Biber & Marino, 1991; Striegel-Moore, Seeley & Lewisohn, 2003), few studies  
5 have examined the psychosocial consequences of DEA. Grissett and Norwell (1992),  
6 Heesacker and Neimayer (1990), Bulik (2002), Evans and Wertheim (1998, 2006), and  
7 Hoek (2002) all showed that bulimic women were characterized by lack of social  
8 competence, which leads to dissatisfaction with social interaction (Grissett & Norwell,  
9 1992). Also, Evans and Wertheim (1998) observed that depression, trait anxiety, and  
10 public self-consciousness explained the associations between eating, weight, and shape  
11 concerns and intimacy difficulties.

12           These and other findings (e.g., Pruitt, Kappius, & Gorman, 1992) support  
13 attachment theory (Bowlby, 1969) and clinical reports in which women with eating  
14 problems are thought to have an insecure attachment style (Humphrey, 1987). For  
15 example, Humphrey (1987) and Striegel-Moore et al. (2003) showed that the parents of  
16 children suffering from DEA seemed more distant, less attentive, less comforting, more  
17 severe, and displayed less confidence in them than the parents of children with normal  
18 eating attitudes. They also observed that anorexic/bulimic children were less  
19 emotionally supportive and more critical and sulky with their parents and displayed less  
20 happiness when in their company. Moreover, anorexic/bulimic children conversed less  
21 easily with their parents and had less confidence in them than control children. Finally,  
22 Kenny and Hart (1992) observed that eating disordered women described themselves as  
23 less securely attached to their parents than did college women.

1           The particularity of the athlete's social environment (e.g., the salience of the  
2 coach's influence) and the engagement in achievement contexts for the purpose of  
3 demonstrating competence (e.g., the salience of perceived physical ability) supports the  
4 value of conducting context-specific examinations of the psychosocial consequences of  
5 DEA among athletes. For example, DEA have considerable physical, psychological,  
6 and physiological consequences for athletes (Filaire, Rouveix, & Bouget, 2008).  
7 Although Filaire et al. (2008) reported the physiological indices and the consequences  
8 of DEA on fatigue and performance, there are currently no studies that have established  
9 the psychosocial consequences of DEA in athletes. Moreover, the literature indicates  
10 that DEA are determined by low self-perceptions in daily life and high-perceived  
11 physical ability in aesthetic sports. Nevertheless, there is a lack of literature that has  
12 investigated the effects of DEA on athletes' physical self-perceptions, and whether  
13 physical self-perceptions might mediate the relationship between DEA and social  
14 relationships.

15           Evans and Wertheim (1998) observed that the associations between eating  
16 problems and insecure attachment style appeared to be mediated by general affective  
17 measures such as social anxiety or self-consciousness in adolescents. However,  
18 these results should not be adapted too hastily to the sport context because of the heavy  
19 emphasis on performance and achievement in elite sport that confers it a specific status  
20 (Scoffier et al., 2010). Based on attachment theory and other studies, the purpose of the  
21 present study was to test a hypothetical model of the effects of DEA on the  
22 interpersonal relationships and the social peer acceptance of athletes in aesthetic sport.  
23 Because of the central role of the physical self-perceptions in athletes' DEA and

1 achievement (Petrie & Greenleaf, 2007), these relationships will also be explored  
2 through athletes' physical self-perceptions.

3 We hypothesized the following: (a) athletes' DEA will be significantly negatively  
4 associated with the quality of social relationships with coach, parents, and peers as  
5 previously observed in daily life; (b) DEA will be most negatively associated with  
6 parent relationships; (c) athletes' DEA will be significantly positively associated with  
7 perceived physical ability and perceived physical appearance because of the function  
8 that DEA serves for this population (i.e., performance enhancement); (d) DEA will be  
9 significantly associated with the self-concept benefit of ability rather than appearance;  
10 (e) perceived physical ability and perceived physical appearance will be significantly  
11 positively related to the quality of social relationships; (f) physical self-perceptions will  
12 significantly mediate the effect of DEA on social relationships as previously shown for  
13 affects. Finally, DEA's influence on social peer acceptance will be examined in an  
14 exploratory way.

## 15 Method

### 16 *Participants and Procedure*

17 The sample comprised 199 voluntary elite figure skaters ranging from 11 to 18  
18 years ( $M_{\text{age}} = 14.35$ ;  $SD = 2.80$ ). The figure skaters practiced intensively ( $M = 8.45$   
19 hours per week,  $SD = 3.45$ ) and had an average of seven years' national experience ( $M$   
20  $= 7.55$ ;  $SD = 1.40$ ). The questionnaires were completed either at the beginning or the  
21 end of training sessions, depending on each athlete's availability. Questionnaires were  
22 completed under standardized conditions (i.e., paper and pencil, and in isolation) and  
23 did not exceed 20 minutes. They were informed beforehand that they were not obliged  
24 to respond and that their anonymity would be respected. They were also informed that



1 this was not a test (i.e., there were no right and wrong answers) and that all responses  
2 would remain strictly confidential and only serve research purposes. Consent was  
3 obtained from all athletes prior to performing the study. The ethics committee of the  
4 University scientific board approved the study.

#### 5 *Measures*

6 *Disordered eating attitudes.* Eating attitudes and behaviors linked to DEA were  
7 measured with the French version of the *Eating Attitude Test* (Garner, Olmsted, Bohr,  
8 & Garfinkel, 1982; Leichner, Steiger, Puentes-Neuman, Perreault, & Gottheil, 1994).  
9 This 26-item self-report inventory consists of three subscales: Factor 1, Dieting,  
10 contains 13 items relating to avoiding fattening food and preoccupation with being  
11 thinner (e.g., *The desire to be thinner worries me*); Factor 2, Bulimia and food  
12 preoccupation, includes 6 items reflecting thoughts about food and bulimic behaviors  
13 (e.g., *I cut out my food in small pieces*); and Factor 3, Oral control, comprises 7 items  
14 relating to self-control of eating and the perceived pressure from others to increase  
15 body weight (e.g., *I vomit after having eaten*). For the purpose of this study and  
16 consistent with previous studies (e.g., Petrie & Greenleaf, 2005), only a global index  
17 measuring the intensity of DEA was used. This global scale exhibited satisfactory  
18 internal consistency for the current sample ( $\alpha = .85$ ).

19 *Sport friendship quality.* Sport friendship quality was measured using the  
20 French version of Weiss and Smith's (1999) *Sport Friendship Quality Scale* (SFQS;  
21 Scoffier, Maïano, & d'Arripe-Longueville, 2009). This scale comprises 22 items  
22 assessing five positive relationship dimensions: self-esteem enhancement and  
23 supportiveness (e.g., *After I make a mistake my friend encourages me*); loyalty and  
24 intimacy (e.g., *My friend and I can talk about anything*); companionship and pleasant

1 play (e.g., *My friend and I do fun things*); things in common (e.g., *My friend and I have*  
2 *common interests*); conflict resolution (e.g., *My friend and I make up easily when we*  
3 *have a fight*); and relationship conflict (e.g., *My friend and I get mad at each other*). In  
4 line with previous studies (Ullrich-French & Smith, 2006), a global index of positive  
5 friendship quality was employed, by averaging the responses to items from the five  
6 positive dimensions. Participants answered each item using a six-point Likert-type  
7 scale ranging from “not at all true” (1) to “really true” (6). Given the instrument’s  
8 recent validation, we tested its factorial structure via confirmatory factorial analysis  
9 (CFA). The CFA indexes obtained were satisfactory ( $\chi^2 = 240.46$ ;  $N = 210$ ;  $df = 192$ ;  
10  $CFI = .89$ ;  $TLI = .88$ ;  $RMSEA = .06$ ;  $RMSEA\ CI = .053 - .072$ ). The scale provided a  
11 good global internal consistency coefficient from the current study sample ( $\alpha = .86$ ).

12 *Coach relationship quality.* The quality of the athletes’ relationship with the  
13 coach was assessed using a modified version of the SFQS. In this adaptation, the word  
14 “friend” was changed to “coach”. A similar adaptation was made by Ullrich-French and  
15 Smith (2006) for other social agents such as parents. The CFA indexes obtained were  
16 satisfying ( $\chi^2 = 223.09$ ;  $N = 210$ ;  $df = 192$ ;  $CFI = .90$ ;  $TLI = .88$ ;  $RMSEA = .06$ ;  
17  $RMSEA\ CI = .055 - .073$ ). Responses to items from positive dimensions and one  
18 negative were averaged to produce the coach relationship quality score. This global  
19 scale exhibited good internal consistency from the current study sample ( $\alpha = .88$ ).  
20 Responses to items from positive dimensions were averaged to produce the coach  
21 relationship quality score.

22 *Self-Description Questionnaire.* Four subscales from the French version of  
23 Marsh’s (1990) *Self-Description Questionnaire (SDQ-II*; Guérin et al., 2003) were  
24 used: (a) *perceived social peer acceptance* was measured via a ten-item subscale (e.g., *I*

1 *get on well with girls*); (b) *parent relationship quality* was measured through an eight-  
2 item subscale (e.g., *I get on well with my parents*); (c) *perceived physical ability* was  
3 adapted to figure skating. This subscale was composed of eight items (e.g., *I am better*  
4 *than the most of my friends in my sport*); and (d) *perceived physical appearance* was  
5 measured through an eight-item subscale (e.g., *I have a beautiful body*). Each subscale  
6 had good internal consistency (see Table 1).

### 7 *Data Analysis*

8         Prior to analyses, all variables were examined for accuracy of data entry,  
9 missing values, and fit between their distributions. The construct validity of the model  
10 was examined through CFA. Given the number of participants and to maintain an  
11 acceptable degree of freedom, the number of indicators per latent variable was reduced.  
12 To this end and according to the recommendations of Bagozzi & Heatherton (1994),  
13 several item parcels were developed using random splitting of averaged items. The  
14 CFA was thus based on 27 observed variables and seven latent factors. Analyses were  
15 performed using bootstrapped maximum likelihood estimation with the AMOS 7.0  
16 program (Arbuckle, 2006) because of the significant multivariate non-normality of the  
17 data (normalized skewness: 58.76; normalized kurtosis: 10.58). Assessment of model  
18 fit was based on multiple indicators: the Comparative Fit Index (CFI); the Tucker-  
19 Lewis Index (TLI; Byrne, 2005; Hu & Bentler, 1998; and Vandenberg & Lance, 2000);  
20 chi square ( $\chi^2$ ); Root Mean Square Error of Approximation (RMSEA); and the RMSEA  
21 90% Confidence Interval (RMSEA 90% CI). Scale reliability was examined with  
22 Cronbach's alpha. The hypothetical model to assess the power of DEA to predict  
23 relationship quality (i.e., coach, friends, peers and parents) through the mediating role  
24 of physical appearance and physical ability perceptions was examined through

1 structural equation modeling (SEM). Finally, individual model parameters such as error  
2 measurement, inter-item correlations and modification indices were examined to  
3 evaluate the conformity of the model to the data.

#### 4 Results

5 *Descriptive statistics.* The descriptive statistics for the sample are presented in  
6 Table 1. DEA were significantly correlated with parent relationship quality and social  
7 peer acceptance. Further, perceived physical ability showed significant correlations  
8 with all other variables (see Table 1).

9 *Effects of disordered eating attitudes on psychosocial variables.* The mediational  
10 model was not tenable because the different stages necessary for mediation were not  
11 significant. Given the insignificant relationships between the variables in the  
12 hypothesized mediator model, the hypothetical model was simplified. We deleted the  
13 mediational effects and examined the direct influence of DEA on friendship quality,  
14 coach relationship quality, parent relationship quality, social peer acceptance, perceived  
15 physical ability and perceived physical appearance. The SEM (Figure 1) was  
16 significantly adjusted to the data ( $\chi^2 = 34.70$ ;  $N = 199$ ;  $df = 304$ ;  $CFI = .91$ ;  $TLI = .90$ ;  
17  $RMSEA = .068$ ;  $CI\ RMSEA = .061 - .077$ ). The results showed a negative relationship  
18 between DEA and parent relationship quality ( $\beta = -.35$ ,  $p < .05$ ) and a positive  
19 influence of DEA on perceived physical ability ( $\beta = .22$ ,  $p < .05$ ). The influence of  
20 DEA on the other variables was not significant. The model explained 10.6% of the  
21 perceived physical ability variance and 15.2% of the parent relationship quality  
22 variance.

#### 23 Discussion

1           This study tested a hypothetical model to examine how DEA affected  
2 interpersonal relationships and social peer acceptance through the mediating role of  
3 physical self-perceptions in adolescent competitors in an aesthetic sport. The results  
4 provided only partial support for the hypothesized relationships among variables. As  
5 expected, DEA in these young skaters negatively influenced parent relationship quality.  
6 This indicates that with the increasing severity of the eating disorder DEA, athletes'  
7 relationship with their parents worsens, which is consistent with previous findings in  
8 the psychosocial literature (Humphrey, 1987; Kenny & Hart, 1992; Striegel-Moore et  
9 al., 2003).

10           DEA had no significant influence on the other social relationships variables in the  
11 hypothesized structural equation model (i.e., quality of relationship with sport friend or  
12 coach, and social peer acceptance). However, the DEA were correlated negatively with  
13 parent relationship quality and social peer acceptance and positively with perceived  
14 physical ability. These results may be explained by the specific context of competitive  
15 sport and the skaters' internalization of their sport's norms, whereby the pursuit of  
16 thinness is seen as a means of achieving high performance (Biensecker & Martz, 1995).  
17 Given the study design, we were unable to verify whether athletes' perceived greater  
18 social acceptance because of thinness was linked to the intensity of DEA, although this  
19 has been previously demonstrated in adolescents (Lieberman, Gauvin, Bukowski, &  
20 White, 2001). Moreover, as expected the influence of DEA is predominant on the  
21 parent relationship quality. This finding could be related to attachment theory (Kenny  
22 & Hart, 1992). That is, it is the parent relationship that suffers most from DEA despite  
23 the importance of the coach in the sport context. One of the reasons that the coach

1 relationship may suffer less from eating problems is the importance for the coach of  
2 performance over health or appearance (Sundgot-Borgen, 1994).

3 The results revealed that DEA positively influenced perceived physical ability but  
4 not perceived physical appearance. These findings contrast those of previous studies in  
5 daily life (Grubb et al., 1993) in which DEA were related to low self-esteem. The  
6 findings can, however, be connected with the results of Scoffier et al. (2010) in which  
7 perceived physical ability was found to be a positive risk factor for DEA. Together  
8 these findings suggest a reciprocal relationship between perceived physical ability and  
9 DEA in high-level athletes: DEA and behaviors lead to weight loss, which heightens  
10 perceived sport-specific physical ability, which in turn reinforces the intensity of DEA,  
11 which lead to further weight loss, and so on. This hypothetical model points to a clear  
12 need for future research. First, researchers need to examine the present relationships  
13 using a longitudinal approach. Second, it would be informative to investigate the  
14 relationships between DEA and social relationships using a qualitative approach.

15 Finally, the last hypothesis was not supported. That is, we did not observe a  
16 mediational role of the physical self-perceptions in the effect of DEA on social  
17 relationships. Future studies should examine whether other variables such as affect (i.e.,  
18 social physique anxiety) mediates this relationship (see Evans & Wertheim, 1998).  
19 Moreover, to better understand the relationships between DEA and the interpersonal  
20 relationship quality in high-level sport, other variables from the model of Shroff and  
21 Thompson (2006) such as internalized norms and mechanisms of social comparison  
22 should be examined.

23 This study has several limitations. First, the data concerning the key variables  
24 were self-reported, suggesting the likelihood that social desirability was operative. In

1 addition, this study used a correlational and cross-sectional design, which limits the  
2 generalization of the relationships between variables (i.e., disordered eating attitudes,  
3 physical self-perceptions, interpersonal relationship quality). Moreover, the  
4 generalization of the results is also limited to young women.

5       The results provided by such types of investigations might help inform programs  
6 to help educate athletes about the dangers they face in their pursuit of excellence and  
7 thus limit the emergence of the intensity of DEA in sports. Coaches, parents, dieticians,  
8 nutritionists, and other professionals involved in this aspect of sports medicine, must be  
9 made aware of the potential development of a vicious circle of the intensity of  
10 disturbed eating attitudes, perceived physical ability, and performance in elite athletes  
11 in order to facilitate the diagnosis of DEA. Indeed, our results indicated that the  
12 intensity of DEA increased perceived physical ability that is generally positively linked  
13 to performance. Because the quality of the coach-athlete relationship, friendship  
14 quality, and peer acceptance did not appear to be affected by the intensity of DEA in  
15 the present study, the members of a sport social environment may not suspect DEA  
16 through relational indexes. Similarly, because adolescence is often accompanied by  
17 deterioration in the parent-child relationship, sport federations need to more  
18 systematically call upon (sport) psychologists and dietitians to design programs that  
19 promote healthy development, encourage a more balanced perspective on the role of  
20 thinness in performance, and provide relevant information for the early identification of  
21 DEA in athletes.

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- 7

1 Table 1. Means (SD), Internal Consistency Coefficients, and Correlations of the  
 2 Studied Variables (N = 199).

	1 Disordered eating attitudes	2 Sport friendship quality	3 Coach relationship quality	4 Parent relationship quality	5 Social peer acceptance	6 Perceived physical appearance	7 Perceived physical ability
Mean	2.50	4.60	3.45	5.12	3.50	3.62	4.70
SD	.80	.46	.92	.96	.90	.98	1.02
$\alpha$	.85	.86	.88	.83	.82	.76	.89
1	–	–	–	–	–	–	–
2	.05	–	–	–	–	–	–
3	-.03	.07	–	–	–	–	–
4	-.18*	.17*	.09	–	–	–	–
5	-.19*	-.01	-.18*	-.03	–	–	–
6	-.05	.01	.09	.09	-.04	–	–
7	.18*	.30**	.37**	.25**	-.16*	.30**	–

3 Notes. \*  $p < .05$ . \*\*  $p < .01$ . For each subscale a six-point Likert-type scale was used.

4

1 Figure caption

2 *Figure 1. Structural Equation Modeling of The Psychosocial Consequences of*

3 *Disordered eating attitudes in Elite Figure Skaters.*

4 *Note. \*  $p < .05$ .*

5

