How Anorexic-like Are the Symptom and Personality Profiles of Aesthetic Athletes?

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ABSTRACT

BACHNER-MELMAN R., A. H. ZOHAR, R. P. EBSTEIN, Y. ELIZUR, and N. CONSTANTINI. How Anorexic-like Are the Symptom and Personality Profiles of Aesthetic Athletes? *Med. Sci. Sports Exerc.*,Vol. 38, No. 4, pp. 628–636, 2006. **Purpose:** We tested the hypothesis that aesthetic athletes (AA) have anorexic-like eating attitudes and behaviors, share personality characteristics such as perfectionism and obsessiveness, and are at high risk of eating disorders. **Methods:** We compared symptomatology, personality variables typical of anorexia nervosa, and lifetime eating disorder prevalence across four groups of Israeli women: 31 anorexics, 111 AA (mostly dancers), 68 nonaesthetic athletes (NAA), and 248 controls. All participants completed self-report measures of symptomatology, harm avoidance, perfectionism, obsessiveness, self-esteem, and self-rated facial attractiveness and were screened for eating disorders. Those screening positively were interviewed and diagnosed using the structured clinical interview for DSM-IV. **Results:** Scores of the anorexic women differed from those of the three other groups in the expected direction on all variables. NAA scored similarly to controls, but had *greater* body satisfaction and *less* drive for thinness. Surprisingly, the AA did not differ from control women on any self-report measure. However, significantly more AA (11.7%) than NAA (5.8%) and controls (4.4%) had a lifetime diagnosis of eating disorder not otherwise specified (EDNOS). The eating attitudes and behavior of the 13 AA with a lifetime history of EDNOS fell intermediately between the anorexic women and the controls, whereas their personality profile resembled that of controls. **Conclusions:** Being a nonaesthetic female athlete in Israel appears to promote body esteem and offer some protection from a preoccupation with dieting. AA also appear to enjoy excellent psychological health; however, a subgroup has EDNOS and appears not to receive appropriate treatment for it. These results lend credibility to the existence of the diagnostic entity of anorexia athletica, proposed to be a subclinical, environmentally influenced eating disorder with a favorable prognosis.
Key Words: AESTHETIC AND NONAESTHETIC ATHLETES, EATING DISORDERS, PERSONALITY, SYMPTOMATOLOGY, ANOREXIA ATHLETICA

Recent decades have witnessed a dramatic increase in women's participation in sports. This has in turn given birth to myriad studies examining the health implications of athletic activity for women, many of which have focused on a hypothesized elevated risk of developing eating problems and disorders in athletes and dancers. Conclusions from these studies have generally been inconsistent, confusing, and contradictory. A meta-analysis of studies estimating risk of eating problems in athletes (43) concluded that athletes are slightly more at risk of eating problems than nonathletes, although the difference is small and the variance between studies is striking.

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In the early 1980s, a provocative and generative hypothesis proposed an analog between athletes and anorexia nervosa (AN) patients (54). According to this analog, both groups are characterized by perfectionism, high self-expectations, competitiveness, hyperactivity, repetitive exercise routines, compulsiveness, drive, a tendency to depression, body image distortions, and a preoccupation with weight and dieting. In ensuing empirical examinations of this hypothesis, athletes and anorexics were in fact found to share certain characteristics (48,52).

In contrast, a large amount of empirical evidence supports an association between exercise and improved physical and psychological well-being. Blumenthal et al. (58) found runners (22 men and 21 women) to show far less psychopathology than AN patients. Powers et al. (39) also found male and female runners to show significantly less psychopathology than AN patients on a range of measures and concluded that very few psychological and physiological features are shared by AN patients and habitual runners. A meta-analysis of 78 studies found the body image of male and female aesthetic, endurance, and ball game sport athletes to be more positive than that of nonathletes (23). Often, no differences between the eating behavior or the

psychological profiles of athletes versus nonathletes are found (17). In a study by DiBartolo and Shaffer (13), female athletes reported higher levels of appearance, athletic, and global self-competence than nonathletes. Participation in sport has been associated with physical health in children and adolescents (42) and with psychological health, including high self-esteem, low anxiety, and low stress levels (4). Thus, whereas excessive exercise undoubtedly plays a complex role in the etiology, development, and maintenance of eating disorders, sport need not have pathological underpinnings, and female athletic involvement is often associated with healthy eating and physiological and psychological functioning. Female athletes have generally been found to function at least as well as, if not better than, female nonathletes.

A discerning look at the literature reveals that anorexic-like profiles and a high prevalence of eating disorders have been reported most frequently in three subgroups of athletes. The first is "obligatory" runners (7), for whom running is more obsessive than competitive. The second is elite athletes, who compete at the highest echelons of their respective sports (26).

The third category of athletes typically found to have problematic attitudes toward eating and weight, on whom we focus in this paper, are participants in aesthetic sports, including dancing, acrobatics, gymnastics, cheerleading, diving, artistic swimming, and figure skating (22,45,49). In these activities, competition results depend to a large extent on judges' opinions and aesthetic evaluations rather than on scientifically measurable variables. Appearance is an important ingredient of success, possibly leading to a heightened focus on weight and body shape. It has been claimed that weight concerns in aesthetic sports begin in childhood (1).

An "attraction to sport" hypothesis proposes that individuals with excessive concern about weight and shape tend to be attracted to certain sports in order to justify their disordered eating and dieting behaviors (51). Delving deeper into the structure of personality, traits such as perfectionism, obsessiveness, and self-sacrifice have been theorized to be crucial for successful athletic performance, on the one hand, but to place athletes at risk of eating disorders, on the other hand (50). There have been surprisingly few empirical investigations of such theories.

Eating disorders in athletes are often said to differ from eating disorders in nonathletes, and the term *anorexia athletica* has been proposed to describe a specific form of subclinical anorexia commonly affecting athletes (44). Eating-disordered athletes have been clinically observed to display less psychopathology (31) and to have a better prognosis (47) than eating-disordered nonathletes.

Few would deny that athletes, especially aesthetic athletes, experience a subculture that emphasizes thinness even more than Western society at large. External environmental elements that may interact with the internal personality factors mentioned above include strong sociocultural pressure to be thin, a desire to enhance performance, strenuous training, revealing attire and shared dressing rooms inviting the comparison of body shape and size, the many mirrors often present in training locations, discussions of weight loss methods, weigh-ins, and comments about weight from coaches, peers, and rivals.

The debate on eating disorders in athletes revolves largely around the perennial nature/nurture question. On the one hand, what is the weight of the environmental factors mentioned above? On the other hand, to what extent are athletes' disordered eating attitudes a product of their largely innate anorexic-like personality structure? We addressed the latter question in an Israeli cultural context by examining the eating behavior and personality profiles of a group of aesthetic athletes (AA) and a group of nonaesthetic athletes (NAA), and comparing them to a group of anorexic women and a group of female controls. We included women only, because most AN patients and most dancers are female.

The instruments selected for administration measured symptomatology and personality traits shown in previous research to consistently differentiate between AN patients and controls. These included behavioral measures of eating-related and general pathology as well as personality constructs that underlie AN. The measures of pathology comprised general symptomatology, disordered eating behavior, drive for thinness, body dissatisfaction, and the importance of the thin ideal, all of which have been shown to be elevated in women with AN. The personality constructs we included because they have been found to accompany AN are perfectionism (3), obsessiveness (21), harm avoidance (6), and low self-esteem (20). In addition, although weight preoccupation has been shown to correlate positively with objective ratings of facial attractiveness (prettier girls have problems), the correlation of weight preoccupation with subjective ratings has been found to be negative (11). For this reason, we decided to include a measure of self-rated facial attractiveness.

We hypothesized that we would find significant differences between the anorexic group and the control group on all measures and few differences between the NAA and the control women. We expected the AA to fall intermediately between the anorexic group and the other two groups on most measures. We also expected to diagnose a higher proportion of clinically significant eating disorders in the group of AA than in the groups of NAA and control women.

METHOD

Participants. Altogether, 458 girls and women aged 13–35 participated in the study. They are a subset of unrelated women participating in a study on the genetics of AN, and they comprised four groups:

1. Thirty-one women with AN. Initially, 322 women recruited from the community via announcements in newspapers, on the Internet, and on college campuses were screened for past or present anorexic symptoms. Full DSM-IV criteria for a lifetime diagnosis of AN were subsequently established using an expanded version of the eating disorders section of the structured clinical interview for DSM-IV (16) (module H) for

TABLE 1. Group comparison of demographic variables.

	AN (N = 31) Mean (SD)	AA (N = 111) Mean (SD)	NAA (N = 68) Mean (SD)	C (N = 248) Mean (SD)	Group Differences[a] F or χ^2 (P)
Age (yr)	23.1 (5.2)	18.9 (4.3)	21.4 (5.2)	23.2 (2.7)	F = 34.22 (<0.001) AA < NAA < C AA < AN
Maternal level of education	2.7 (0.9)	3.0 (0.9)	3.0 (1.0)	3.0 (1.0)	F = 0.64 (0.59) AN = AA = NAA = C
Paternal level of education	2.8 (0.96)	3.1(1.1)	2.9 (1.0)	3.1 (1.1)	F = 0.98 (0.40) AN = AA = NAA = C
Weekly sport hours	4.9 (7.3)	20.9 (7.8)	16.3 (6.3)	1.2 (2.2)	F = 117.06 (<0.001) AA > NAA > (AN = C)
BMI	16.7 (1.2)	19.7 (2.2)	21.5 (2.4)	22.0 (3.2)	F = 43.21 (<0.001) AN < AA < (NAA = C)
% married	0	2.7	5.9	9.3	χ^2 = 11.31 (0.08) AN = AA = NAA = C
% Jewish	100	97.3	95.6	98.8	χ^2 = 7.02 (0.64) AN = AA = NAA = C

[a] The group comparisons are a summary of a series of bi-group contrasts. Group means are described as equal if $P > 0.05$ and unequal if $P < 0.05$.
Parental education: 1 = primary school, 2 = high school, 3 = B.A., 4 = M.A., 5 = Ph.D.
AN, women with anorexia nervosa; AA, aesthetic athletes; NAA, nonaesthetic athletes; C, female controls; BMI, body mass index.

204 of them. Diagnosis were made by R.B.M., a psychologist, and confirmed by A.H.Z., a senior clinical psychologist, who read precise minutes of the interviews. Even though we relied on self-reported clinical information, SCID-based current and lifetime diagnoses of AN have been shown to be highly reliable (53). Interviews were conducted in person or, for interviewees unable to attend an in-person interview, by telephone. No significant differences in eating disorder assessments have been found between telephone and personal interviews (28). Current AN symptomatology was also assessed in the interview, and we included in this study only the 31 currently ill women. Although we adopted strict DSM-IV criteria for a lifetime diagnosis of AN, the broader inclusion criteria for this study were a body mass index (BMI) < 18, fear of weight gain, and a distorted body image as defined in the DSM-IV.

2. One hundred eleven current aesthetic athletes, who trained for a minimum of 10 $h \cdot wk^{-1}$ and performed regularly. Ninety-seven of these were dancers, nine were gymnasts, two were acrobats, and three were artistic (synchronized) swimmers. They were recruited via professional dance classes and companies and sport organizations.
3. Sixty-eight current NAA, who trained for a minimum of 10 $h \cdot wk^{-1}$ and competed regularly at a high level of their respective sports in Israel. Thirty-two were endurance athletes, mostly runners (of all distances) and swimmers; 23 competed at a high level in ball games such as basketball and volleyball; eight competed in technical sports such as sailing and fencing; and five competed in the martial arts. They were recruited via sports unions and the national Israeli sports institute.
4. The 248 control women, none of whom met our criteria for an AA or NAA, were recruited via announcements on college campuses and in the community.

Demographic information is presented and compared across groups in Table 1.

Instruments. In addition to a questionnaire on demographics, sport activity, and medical and menstrual history, respondents completed the following.

A. Measures of pathology.
   1. The Brief Symptom Inventory (BSI, alpha = 0.96) is a 53-item checklist scored on a five-point Likert-like scale from "not at all" to "very much" (12). The dimensions are somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The BSI has been found to be elevated in anorexic patients (29). The Hebrew version (2) has been widely used in clinical work and in research.
   2. The Eating Attitudes Test–26 (EAT-26, alpha = 0.93) is a 26-item self-report factor-analytically derived scale, commonly used as a screen for eating disorders (19). The Hebrew translation (30) has been used widely for research and clinical purposes. Scoring is on a six-point Likert scale with answers ranging from "never" to "always." The three least frequent categories ("never," "rarely," and "sometimes") are scored 0, "often" 1, "usually" 2, and "always" 3.
   3. The Eating Disorder Inventory (EDI-2) is a self-report measure of symptoms generally related to eating disorders (18) and widely used in clinical and research settings in Israel (37). We used 2 of its 11 subscales to assess body dissatisfaction (EDIbd, alpha = 0.92) and drive for thinness (EDIdt, alpha = 0.93). The seven-item EDIdt assesses preoccupation with body weight, fear of gaining weight, desire to be thin, and food intake restriction. The nine-item EDIbd measures overall (dis)satisfaction with the shape and size of various body parts. Respondents are asked to state how often (on a scale of never = 0 to always = 5) they think, for example, that their hips or thighs are too large.
   4. The Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ, alpha = 0.9) assesses the

importance of appearance and the thin ideal (24). We included 13 of the 14 items, excluding item 14 because it was culturally inappropriate and has been found to lower reliability (24). The SATAQ, with an awareness (SATAQawr) and an internalization subscale (SATAQint), is a powerful predictor of eating disorders (10) and was translated into Hebrew, back-translated, and revised for this study.

B. Measures of personality traits associated with AN.
   1. The Child and Adolescent Perfectionism Scale (CAPS, alpha = 0.91) consists of 22 items, each with five response categories (25). Its two subscales are self-oriented perfectionism and socially prescribed perfectionism, both of which are elevated in AN (9). In a previous study, a Hebrew version was administered to 256 individuals aged 18–32; it correlated with obsessive thoughts and behaviors, and its Cronbach alpha was 0.94 (55).
   2. The harm avoidance subscale of the Tridimensional Personality Questionnaire (TPQha) is a 34-item subscale of the TPQ (8), measuring a major, purportedly heritable personality temperament (TPQha, alpha = 0.86). TPQha represents a preference for safe routine and risk avoidance and a tendency toward anticipatory anxiety, shyness, and fatigability. The TPQ has been translated into Hebrew and tested on a large community sample (57).
   3. The Maudsley Obsessive-Compulsive Inventory (MOCI, alpha = 0.79) is a 30-item yes/no inventory that assesses obsessions and compulsions and reduces to four subscales: cleaning, exactness, moralistic obsessions, and slowness. AN patients have been found to score higher than controls yet lower than obsessive-compulsive disorder, depression, or anxiety disorder patients on the MOCI (14), which has been previously administered in Hebrew (56).
   4. The Rosenberg Self-Esteem Scale (SES, alpha = 0.9), a 10-item instrument scored on a four-point Likert scale, was used to assess self-esteem, with higher scores indicating higher levels of self-esteem (40). Discriminant validity for the SES has been shown in the context of eating disorders (15). It was translated into Hebrew, back-translated, and revised for this study.
   5. Self-rated attractiveness was measured by a single question: "On a scale between 0 and 10, how attractive do you think your face is?"

Procedure. Participants and parents of participants under 18 yr of age signed consent forms and returned them in person or by mail after receiving a full explanation about the project. Respondents filled out a booklet containing the above scales and delivered or mailed it directly to the investigators (not via coaches) in an attempt to maximize the reliability of the athletes' responses. A subject number only, with no identifying personal information, was written on booklets. Approval for the study was obtained from the Helsinki ethics committee of the Israeli Ministry of Health and the ethics committee of the Hebrew University.

All respondents in the control and athlete groups were thoroughly screened for a possible history of an eating disorder. The following criteria were noted as possible indicators of eating disturbance: a BMI < 18 or > 30 currently or since reaching current height; an ideal BMI < 18; amenorrhea; an EAT-26 score > 20; or body dissatisfaction scores in the highest percentile (>38). In addition, respondents were asked whether "eating has ever been problematic or a source of distress for you," and positive responses were examined. Women who described symptoms compatible with eating disorders, or who fulfilled at least one of the above criteria, were contacted by the first author and screened for the probable presence or history of an eating disorder. Those who screened positively were interviewed as described in the "Participants" (group 1) section above, and lifetime eating disorder diagnoses were recorded.

Statistical analyses. A multivariate ANCOVA was run entering group status (AN, AA, NAA, controls) as the fixed factor, and the self-report measures (general symptomatology, disordered eating, body dissatisfaction, drive for thinness, importance of the thin ideal, perfectionism, obsessiveness, self-esteem, and self-rated attractiveness) as dependent variables. Age, BMI, and weekly number of hours spent doing sport were entered as covariates because these variables differed across groups (Table 1). The prevalence of eating disorders was compared across the AA, NAA, and C groups using a χ^2 test.

RESULTS

Measures of pathology. As presented in Table 2, the AN group showed significantly more general and eating pathology and greater body dissatisfaction, drive for thinness, adherence to the thin ideal, and anxiety over not exercising than the other three groups, as predicted. The NAA group scored no higher than female controls on any measure, as predicted. In fact, they scored *lower* than the three other groups on body dissatisfaction (are more satisfied with their bodies) and *lower* than the AN and control groups on drive for thinness. However, contrary to our hypothesis, the AA group did *not* differ from female controls on any measure, showing no evidence of general symptomatology or disturbed attitudes toward eating or weight.

Measures of personality traits associated with AN. The AN group, as expected, scored higher than all three other groups on harm avoidance, perfectionism, and obsessiveness, and lower than all three on self-esteem and self-rated attractiveness. We had expected scores for the AA group to fall intermediately between the AN group and the NAA and C groups. However, the personality profile of the AA group did not differ significantly on any variable from that of the C and NAA groups, and thus bore no similarity whatsoever to the AN profile (Table 2).

TABLE 2. Group comparisons of measures of eating-related and general psychopathology and measures of personality characteristics associated with AN.

	AN (*N* = 31)	AA (*N* = 111)	NAA (*N* = 68)	C (*N* = 248)	Group Differences[a]
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	*F* Value (*P* Value)
Eating-related and general psychopathology					
General symptomatology (BSI)	89.47 (32.74)	56.66 (26.26)	52.30 (25.10)	53.12 (27.29)	14.43 (<0.001) AN > (AA = NAA = C)
Disturbed eating (EAT-26)	37.57 (11.42)	11.15 (10.37)	9.58 (11.92)	11.84 (12.61)	66.87 (<0.001) AN > (AA = NAA = C)
Body dissatisfaction (EDI-BD)	28.57 (10.93)	20.60 (10.96)	17.69 (10.40)	22.46 (10.59)	26.73 (<0.001) AN > (AA = C) > NAA
Drive for thinness (EDI-DT)	28.53 (4.72)	16.39 (9.76)	13.38 (9.28)	16.41 (9.46)	39.15 (<0.001) AN > C > NAA
Importance of thin ideal (SATAQ)	56.20 (13.40)	46.38 (14.26)	43.38 (14.32)	48.67 (13.79)	AN > (AA = C) 5.29 (<0.01) AN > (AA = NAA = C)
Personality characteristics associated with AN					
Harm avoidance (TPQha)	19.77 (7.25)	13.58 (5.75)	12.00 (5.92)	14.32 (6.12)	6.98 (<0.001) AN > (AA = NAA = C)
Perfectionism (CAPS)	47.57 (14.37)	39.0 (12.67)	40.75 (14.06)	39.44 (12.67)	4.13 (<0.01) AN > (AA = NAA = C)
Obsessiveness (MOCI)	11.47 (5.87)	9.49 (4.56)	8.28 (4.70)	7.83 (4.43)	6.66 (<0.001) AN > (AA = NAA = C)
Self-esteem (SES)	14.87 (6.47)	19.63 (4.90)	21.53 (5.44)	20.78 (5.22)	9.74 (<0.001) AN < (AA = NAA = C)
Self-rated attractiveness	5.10 (2.09)	7.00 (1.30)	7.16 (1.34)	7.09 (1.39)	14.85 (<0.001) AN < (AA = NAA = C)

[a] The group comparisons are a summary of a series of bi-group contrasts. Group means are described as equal if $P > 0.05$, and unequal if $P < 0.05$.
BMI, age, and number of hours per week of physical activity entered as covariates.
AN, women with anorexia nervosa; AA, aesthetic athletes; NAA, nonaesthetic athletes; C, female controls.

Lifetime prevalence of eating disorders diagnosed in athlete and control groups. In the group of AA, five lifetime cases of AN (4.5%), two cases of bulimia nervosa (BN) (1.8%), and 13 cases of eating disorder not otherwise specified (EDNOS) (11.7%) were diagnosed. In the group of NAA, one case of lifetime AN (1.4%), one case of lifetime BN (1.4%), and four cases of EDNOS (5.8%) were identified. In the group of control women, eight cases of lifetime AN (3.2%), seven of BN (2.8%), and 11 of EDNOS (4.4%) were diagnosed. In the control group, the cases of EDNOS included five cases of subclinical AN (weight or amenorrhea criterion not fulfilled), one case of subclinical BN (frequency of bingeing less than twice per week for 3 months), two cases of binge eating disorder, and three cases of regular purging without bingeing. In the NAA group, the cases of EDNOS were two cases of subclinical BN and two cases of regular purging without bingeing. In the AA group, the EDNOS cases included six cases of subclinical AN and seven cases of subclinical BN.

TABLE 3. Prevalence of lifetime eating disorders in female AA versus women who are not AA.

	Female AA (*N* = 111)	Women Who Are Not AA (*N* = 316)	χ^2 (*P*)	Odds Ratio
AN	4.5% (*N* = 5)	2.8% (*N* = 9)	0.71 (0.40)	1.58
BN	1.8% (*N* = 2)	2.5% (*N* = 8)	0.19 (0.66)	0.71
EDNOS	11.7% (*N* = 13)	4.7% (*N* = 15)	6.50 (0.01)	2.47
Any eating disorder	17.1% (*N* = 19)	8.9% (*N* = 28)	5.71 (0.02)	1.93

Because the prevalence of eating disorders did not differ significantly between the NAA and C groups, prevalence in the AA group was compared with that in the combined group of 316 women (68 NAA and 248 controls) who were not AA. Table 3 presents the difference in prevalence of lifetime eating disorders between AA and other women.

***Post hoc* examination of AA with EDNOS.** Our observation of a high prevalence of EDNOS in the AA group, coupled with the hypothesized diagnosis of anorexia athletica, prompted us to examine the degree to which the symptomatology and personality profile of the 13 AA with a lifetime diagnosis of EDNOS resembled that of the AN group and women who had never had an eating disorder. As can be seen from Table 4, this subgroup of AA with EDNOS displayed problematic eating and body image symptoms, with most variables falling intermediately between the AN women and the control women. However, they did *not* show symptomatology unrelated to eating (BSI), nor a personality profile typically associated with eating disorders. Interestingly, whereas five of the seven AA with a lifetime diagnosis of AN or BN had been treated for their eating disorder, only three of the 13 AA with a lifetime diagnosis of EDNOS reported having received treatment.

DISCUSSION

In this study, we compared a set of symptoms and personality variables typical of AN across four groups: anorexic women, AA, NAA, and control women. The central and surprising finding is that AA, who have often been reported to share at least some behavioral and personality traits

TABLE 4. Measures of eating-related and general psychopathology and measures of personality characteristics associated with AN of female AA with EDNOS compared with those of AN women and female controls.

	AN (N = 31)	EDNOS (N = 13)	C (N = 359)	Group Differences[a]
	Mean (SD)	Mean (SD)	Mean (SD)	F Value (P Value)
Eating-related and general psychopathology				
General symptomatology (BSI)	89.47 (32.74)	65.00 (18.08)	52.42 (25.84)	26.04 (<0.001) AN > (EDNOS = C)
Disturbed eating (EAT-26)	37.57 (11.42)	20.46 (8.61)	8.25 (8.67)	165.39 (<0.001) AN > EDNOS > C
Body dissatisfaction (EDI-BD)	28.57 (10.93)	29.15 (11.36)	20.28 (10.41)	44.30 (<0.001) (AN = EDNOS) > C
Drive for thinness (EDI-DT)	28.53 (4.72)	25.92 (5.09)	14.24 (8.49)	81.95 (<0.001) AN > EDNOS > C
Importance of thin ideal (SATAQ)	56.20 (13.40)	52.08 (14.94)	46.39 (13.32)	8.75 (<0.01) (AN = EDNOS) > C
Personality characteristics associated with AN				
Harm avoidance (TPQha)	19.77 (7.25)	14.77 (5.88)	13.65 (5.95)	10.31 (<0.001) AN > C
Perfectionism (CAPS)	47.57 (14.37)	39.08 (10.28)	38.97 (13.53)	4.74 (<0.01) AN > (EDNOS = C)
Obsessiveness (MOCI)	11.47 (5.87)	8.92 (3.40)	8.31 (4.61)	9.21 (<0.001) AN > (EDNOS = C)
Self-esteem (SES)	14.87 (6.47)	17.77 (4.23)	20.97 (5.01)	17.40 (<0.001) AN < C
Self-rated attractiveness	5.10 (2.09)	7.19 (1.41)	7.10 (1.32)	22.56 (<0.001) AN < (EDNOS = C)

[a] The group comparisons are a summary of a series of bi-group contrasts. Group means are described as equal if $P > 0.05$, and unequal if $P < 0.05$.
BMI, age, and number of hours per week of physical activity entered as covariates
AN, women with anorexia nervosa; EDNOS, AA with a lifetime diagnosis of eating disorder not otherwise specified; C, female controls.

with AN patients, did not differ from female controls on even one measure, painting an overall picture of general balance, robustness, and adjustment. We found them to show no greater levels of disturbed eating behavior and attitudes than control women and to be no more perfectionistic, obsessive, or harm avoidant. Their self-esteem was on a par with controls, and they rated their faces as being as attractive as controls did.

The women with AN differed significantly in the expected direction from the three other groups on all variables, displaying general and eating-related pathology, high harm avoidance, perfectionism, and obsessiveness, low self-esteem, and low evaluation of their facial attractiveness. The NAA and control groups scored similarly, as predicted, on all measures administered except two: NAA were *more* satisfied with their bodies and had a *weaker* drive for thinness than female controls. The prevalence of eating disorders among the NAA did not differ from the prevalence in a group of nonathlete control women. These findings support the general well-being of female athletes and the possibility that sport may contribute to their psychological health. Far from constituting a risk of eating disorders, being an NAA, at least in Israel, appears to promote body esteem and offer some protection from a preoccupation with dieting.

Nevertheless, we diagnosed a significantly greater proportion of cases, not of AN or BN, but of lifetime EDNOS in the group of AA than in the NAA and control groups. This is an interesting finding in light of the proposed diagnostic entity of anorexia athletica (46). Anorexia athletica has been described as a subtype of anorexia, a form of EDNOS with a favorable prognosis commonly affecting athletes and attributable more to environmental pressures to be thin and the constant scrutiny to which athletes and dancers are subjected than to deep-rooted pathology. Our findings lend credibility to the existence of such a syndrome. A *post hoc* analysis of the 13 AA who had an EDNOS revealed that, whereas they currently displayed more disturbed attitudes toward eating, weight, and body image than women who had never had an eating disorder, their personality profile resembled that of control women rather than that of anorexic women. The eating pathology diagnosed in this group therefore appears due essentially to specific environmental factors. Note, however, that until such an analysis is replicated with a larger number of AA with EDNOS, these conclusions must be regarded as provisional.

A parallel could be drawn from research on conduct disorder. It has been shown that, whereas severe and persistent antisocial behavior is associated with personal vulnerabilities such as hyperactivity, inattention, impulsivity, and aggression, antisocial behavior limited to the period of adolescence, which has a better prognosis, is related instead to developmental and social pressures (35). Both adolescent conduct disorder and anorexia athletica may be characterized by the absence of the person–environment interaction associated with a more severe form of the psychiatric disorder (41). According to this concept of anorexia athletica, athletes or dancers exhibiting both anorexic symptoms and an AN-related personality profile would be diagnosed with AN, similarly

to nonathletes who develop AN. The single-mindedness of athletes and dancers combined with the ongoing environmental messages to be thin may promote monoideistic patterns characteristic of AN in interpersonal relationships and intrapsychic preoccupations, regardless of personality structure (27). Thus, whereas these athletes may develop and even be encouraged to develop unhealthy eating and weight-control habits, we suggest that these remain on the behavioral level and are not necessarily an indication of deeper psychopathology. A large empirical study of the clinical validity of anorexia athletica would be a valuable addition to research.

It is surprising that in Israel, where the prevalence of eating disorders is on par with that in most of the Western world (34), such a healthy overall profile should be observed in athletes and dancers. The vulnerability of athletes to eating disorders may depend on a balance between promoting and protective factors (38). Superior psychological functioning (32), a positive outlook on life, and high self-efficacy (17) have been identified as protective factors and may characterize Israeli athletes and dancers. Supportive coaching and nutritional education may also be exerting a protective influence. Future research should focus on specific environmental factors in general and in Israel to help determine their protective or promoting influences on eating and weight problems. It cannot be ruled out, however, that the participating dancers and athletes might have avoided reporting current eating problems or specific psychological features for fear that their coaches would find out or that they would be stigmatized for needing treatment. Because the study was presented to potential participants as a study of personality and eating habits, there may have been some self-selection of participants with a bias toward those with nothing to hide.

This study has a number of further limitations. First, the AA were younger than the NAA, who were younger than both the AN group and the control group. It is thus possible that some of the AA had not yet passed the critical age for the development of an eating disorder and would develop one in the future. Second, we lacked information about and sufficient numbers of athletes in individual sport categories, so we could not evaluate the risk associated with specific sports or styles of dance. For example, classical ballet dancers are typically leaner than other dancers (36) and should arguably be examined separately from other dancers. Third, we relied to a large extent on subjective self-report, which is vulnerable to social desirability. Parameter estimates may be inflated by common method variance. Self-reported clinical information has been shown to be highly reliable (53). Research has shown that, whereas anorexic, bulimic, and underweight women report their weights remarkably reliably, healthy control participants tend to slightly underreport their weight, especially as BMI rises (33). Whereas the correlation between actual weight and reported weight is typically > 0.95 (5), the accuracy of self-reported weight may vary slightly across groups.

These limitations notwithstanding, we found overall a surprising and reassuring absence of eating problems and of personality traits that typically underlie AN in both aesthetic and nonaesthetic professional Israeli athletes. These athletes demonstrated remarkable overall psychological health and resilience and low rates of lifetime AN and BN. This finding joins the large body of research demonstrating the benefits of athletic participation for women and extends it to show that even dance and related aesthetic sports can go hand in hand with psychological stability and health.

Yet although AA, like NAA, no doubt benefit from the advantages of physical activity, the environmental pressures concerning appearance and weight appear to adversely affect a select minority, based on the high lifetime prevalence of EDNOS we found in this group. Further research is needed to examine whether aesthetic athletes who develop EDNOS (possibly anorexia athletica) are particularly prone to environmental pressures, whether they objectively experience more pressure to lose weight than others, whether they differ genetically from other athletes, or whether other factors can explain why they and not others develop eating problems. Our results indicate that this subgroup may not be receiving the treatment they need to ameliorate their eating attitudes and behaviors. Coaches may consciously or subconsciously overlook any eating problems that come to their attention, resulting in an attitude of denial. Athletes and dancers may fear that any eating problems may be discovered and that they will consequently be restricted in their activities and performances and/or stigmatized by being sent for treatment. In addition, there may be a feeling that abnormal weight control methods are normal and acceptable in specific subcultures because they are common. It is therefore critical to challenge the existence of such norms and to develop effective prevention and treatment programs. Coaches, trainers, sport physicians, and sport psychologists should be alerted to the risk of eating problems in dancers and athletes and educated to detect difficulties and provide access, when needed, to appropriate support and treatment.

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