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INTERNATIONAL ARTICLE

Eating Disorders and Altered Eating Behaviors in Adolescents of Normal Weight in a Spanish City

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Purpose: **To study the prevalence of altered eating behaviors or eating disorder–related behaviors among adolescents of normal weight that do not fulfill criteria for anorexia nervosa and bulimia nervosa.**

Method: **Cross-sectional study by means of a self-completed questionnaire (School of Nutrition of Granada, Spain) and measurement of weight and height in a population of 491 schoolchildren aged 14–18 years. The statistical inferences and estimation of risk are based on comparison of proportions and means test, and the relative inequality of prevalences.**

Results: **Of 491 adolescents of normal weight, 9% (females 2:1) were following diets; 42% presented "recurrent episodes of binging" with the sensation of loss of self-control; and 41%% avoided specific types of food. Overall, 46.2% presented altered eating behavior. Factors significantly associated with this were the occurrence of periods of food abstinence and the use of purgatives [confidence interval 95% (CI 95%) prevalence ratio (PR) 1.41–2.02]. Compensatory behaviors were present in 33% of the adolescents, predominantly in females (CI 95% PR 1.79–3.07). The prevalences of abnormal eating behaviors were 16.3% for those related to anorexia (A-RB) and 17.1% for those related to bulimia (B-RB), with a clear predominance of females (2:1) and public education. There seems to be a greater aesthetic concern among those with B-RB and more worry about weight among those with A-RB.**

Conclusions: **A high proportion of adolescents with abnormal eating behaviors and an altered perception of body fat may currently be diagnosed as having atypical eating disorder" (Diagnostic and Statistical Manual of Mental Disorders, Fourth Revision) considering that their body mass index was within normal range.** © *Society for Adolescent Medicine, 2001*

KEY WORDS:

Altered eating behaviors
Eating disorder-related behaviors
Atypical eating disorders
Adolescents
Spain

Significant changes have been observed in the eating habits of adolescents in recent years, with aspects of physical appearance, including a slim figure, being valued to an extreme degree (1,2) Such inadequate eating behavior is giving rise to an increase in eating disorders, which are causing great social concern not only because of their intrinsic seriousness, but also because of their increasing incidence and their appearance at ever-younger ages.

Eating disorders are defined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Revision (DSM IV) (3) as all those disorders in which serious alterations are produced in eating behavior. Notable among these disorders are anorexia and bulimia nervosa, the essential characteristic of which is that they are largely brought on by the alteration in the subject's perceptions of body shape and weight. In otherwise healthy subjects, altered eating behaviors are observed with increasing frequency (4). These behaviors include the extreme voluntary re-

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striction of caloric intake, provoked vomiting, unusual eating patterns, or episodes of voracious appetite followed by purgative-type behavior (vomiting or use of laxatives, diuretics, or enemas) or by nonpurgative behavior [compulsive performance of physical exercise (5)]. Further, body dissatisfaction and perceived overweight are consistent correlates of dieting and binge eating in adolescents (6).

The prevalence of problematic eating behavior and eating disorder symptoms appears to be abating but remains a significant problem as judged by studies in the United States among college students (7). In Spain the prevalence of nonadequate eating behavior expressed by borderline symptoms in teenagers is not known. There are no consensus criteria for the diagnosis of nonadequate or altered eating behavior; thus, such criteria are typically set by the authors (8). Frequently, borderline symptoms (based on DSM description of eating behavior) showing distorted attitudes toward weight, body and food, related to disturbances of body image (9), are widely used as risk factors for eating disorders (7).

Eating characteristics in early teenage years are useful predictors of eating psychopathology in early adulthood (10). Some authors suggest that problems in self-control of eating behavior associates with risk for the development of subsequent anorexia or bulimia nervosa (11). Individuals at risk are characterized as introverted, timid, perfectionist, and intelligent. Overweight in childhood or at the onset of puberty have been found in 40% of subjects (12). Dieting in adolescents may represent, in some cases, a borderline eating disorder (13).

It is therefore important to study these disorders, which appear mainly between the ages of 12 and 25 years, to determine the value adolescents place on their weight, their fear of gaining weight, and the alteration in their perception of body weight and figure. The prevention and promotion of health require identification of adolescents who have developed or continue to present anomalous eating behavior such as dieting and binging, because these behaviors may possibly be considered initial manifestations of eating disorders.

Our objectives were to study behaviors involving risk of eating disorders in healthy adolescents and to determine the frequency of altered eating behaviors and eating disorder–related behaviors (ED-RBs).

Materials and Methods

A cross-sectional study was conducted in Cadiz, Spain, on school students aged 14–18 years during the academic year 1995–1996. On the basis of the total of 12,249 students registered for the courses corresponding to these ages, and taking an assumed prevalence of eating disorders of about 50% and a design effect of 5%, for an accuracy of 10%, the minimum size of the sample required was set at 472 students.

A total of six educational centers representative of the total school population of the city were selected. For these, authorization to carry out the study was obtained through from the school management. In these schools, students were stratified according to gender, age, type of course followed [29% were following a vocational studies course (FP) and the rest the normal academic studies courses (BUP/ESO)], and type of school (public versus private/coordinated). Then, a random selection of students by gender, age (14–18 years), and type of study was made from the student roll.

All adolescents selected were measured for height and weight using the same instrumentation and personnel. Each adolescent was asked to return a self-completed written questionnaire. The questionnaire had been previously tested on 60 students at a school not selected for the study, and corrected accordingly. It consisted of three sections: The first included questions on self-image, use of diets and slimming medications, and eating disorders; the second dealt with eating habits over the previous 6 months and included a 24-h nutritional survey (School of Nutrition of Granada, Spain); the third was intended to survey general knowledge about nutrition.

The study was carried out on a total of 663 students. Fifty-nine of the returned questionnaires were rejected, 15 because of incomplete or inadequate responses, 18 because the respondent's age did not meet the study inclusion criteria, and 26 because the corresponding anthropometric data could not be obtained. In addition, another 113 adolescents were excluded from the study because of a body mass index (BMI) of >25 kg/m^2. The final study sample was 491.

Altered eating behavior is defined as the existence of any type of diet not justified, indicated, or supervised by an adult, in a subject having an altered perception of his or her weight. Also included in the definition is the existence of episodes of abnormally high consumption of food during a short period of time, not related to conditions of stress or anxiety [a maximum of 2 h, as established in the DSM IV (3)].

The existence of ED-RBs was studied differentiating those related to anorexia and those to bulimia.

Table 1. Anthropometric Values

	Males	Females	Total
No. of subjects	275	216	491
Age (yr) (SD)	16.0 (1.1)	15.7 (1,2)	15.9 (1.2)
Weight (kg) (SD)	61.4 (8.2)	53.9 (6.0)	58.13 (8.22)
P3	45.78	42.75	43.42
P50	61.40	50.80	58.00
P97	77.22	65.00	75.00
Height (cm) (SD)	170 (7.3)	160 (6.5)	166 (8.7)
P3	157.0	149.7	150.5
P50	171.0	160.5	166.0
P97	182.5	172.4	182.0
BMI (kg/m^2) (SD)	21.0 (2.1)	20.9 (1.9)	21.0 (2.0)
P3	17.0	17.58	17.34
P50	21.1	20.89	20.99
P97	24.6	24.47	24.57

P = percentile

The existence of the former, anorexia-related behavior (A-RB), was based on the presence of altered perception of body weight and voluntary dietary restrictions (diets and abstinence). The existence of the latter, bulimia-related behavior (B-RB), was considered when there coexisted recurrent episodes of compulsive ingestion and compensatory behaviors (vomiting two or three times a week over a 3-month period, use of medication, strict dieting, or abstinence).

For the statistical analysis of the results, the EPI-INFO (CDC, Atlanta, Release 6.04) and SPSS (Release 8.0) packages were used. The statistical inferences are based on the comparison of proportions test (Chi-square), means (Student's *t*-test, Mann–Whitney, analysis of variance (ANOVA), and Kruskal–Wallis) and analysis of homogeneity of the variance (Barlett). Given the cross-sectional design of the study, for the estimation of risk we used the relative inequality of prevalence or prevalence ratio (RIP or PR) with the confidence interval (CI) calculated at 95% (CI 95%), the interpretation of which is similar to the relative risk; as the test of association, the Chi-square and Fisher exact tests were used.

Results

A total of 491 students met the criteria for inclusion in the study. Table 1 gives their anthropometric values. There was only a slight predominance of females (56%); the ages and body mass index for males and females were similar.

Table 2 shows the frequency of eating behaviors studied and purgative attitudes. Nonjustified diets and altered eating behaviors predominated in the adolescent girls. Although the episodes of bulimic

Table 2. Altered Eating Behaviors

	Males (n = 275)	Females (n = 216)	Total		Prevalence Ratio, 95% CI
			N	%	
Recurrent episodes of compulsive ingestion	104	104	208	43.5	
Slimming medication*†	6	30	36	7.3	
Daily physical exercise performed*	117	48	165	38.7	
Dieting not medically justified*	15	29	44	9.0	
Exclusion of certain foods*‡	99	104	201	41.7	
Dieting not medically justified + physical exercise	14	24	38	7.7	
Weight dissatisfication*	99	100	199	41.3	
Altered eating behaviors (AEB)					
Private schools	23	17	40		0.69, 1.83
Public schools*	86	101	187		1.16, 1.76
Total*	109	118	227	46.2	1.14, 1.67
Eating disorder–related behaviors (ED-RB)					
Anorexia-related behaviors (A-RB)					
Private schools*	2	8	10		1.36, 27.2
Public schools*	19	51	70		2.00, 5.31
Total*	21	59	80	16.3	2.25, 5.69
Bulimia-related behaviors (B-RB)					
Private schools	6	7	13		0.64, 4.91
Public schools*	23	48	71		1.61, 4.00
Total*	29	55	84	17.1	2.28, 3.47

*Statistically significant differences found between males and females.

†Includes medications and infusions not taken on the advice of any health care professional (fiber, laxatives, diuretics, thyroidal hormones, and diuretic infusions made from natural plants).

‡Respondents were asked about their voluntary exclusion of any of eight groups of foods; specific foods included in each of the eight groups were indicated in a sheet attached to the questionnaire (see Table 3).

behavior appeared with equal frequency in both genders, compensatory or purgative attitudes were more frequent in females as well.

In 227 students (46.2%), altered eating behavior was found based on the high frequency of recurrent episodes of compulsive food ingestion (Table 2), with similar frequency in the two genders. The prevalence of A-RB (coexistence of altered perception of weight with dietary restrictions) and B-RB (coexistence of recurrent episodes of compulsive food ingestion with compensatory behavior) was much lower (16.3% and 17.1%, respectively), with a clear female predominance in both.

Statistically significant gender differences were not found in the presentation of A-RB and B-RB, although males had more cases of B-RB than A-RB (29 vs. 21), whereas the opposite was found for females, who had more cases of A-RB than of B-RB.

We did not find significant differences in the presentation of altered eating behaviors between public and private schools; nevertheless, when we conducted a stratified analysis of the prevalence of ED-RB by school type and gender, we found that females in public schools had significantly higher prevalence figures of conduct related to both anorexia and bulimia. The results of the survey are given in three subsequent sections.

Reduction in Total Food Ingestion and Initiation of Restriction of Foods in the Diet by Excluding High Caloric-Content Foods

At the time of the survey, 44 adolescents in the study were following some form of diet, and up to 208 subjects presented recurrent episodes of binging, with the sensation of loss of control. In addition to the diets, episodes of abstinence from eating were frequent, with 121 of the subjects (24.6%) stating that they voluntarily underwent periods of not eating; of those, 26 did so frequently. These periods occurred every month or two in 32 subjects and lasted for 1 day in 50% and 2 days in 19% of cases. The occurrence of these periods of abstinence was associated significantly with the factor of dissatisfaction with body image (CI 95% PR 1.32–2.46); however, no correlation was found between the frequency or duration of these periods and the degree of concern about body weight and figure. The association between the occurrence of periods of abstinence and the variable we defined as altered eating behavior ($p = .0001$) was also significant.

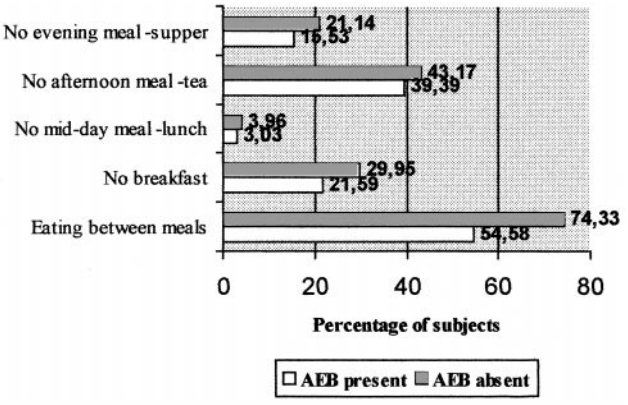

Figure 1. *Frequency of adolescents who miss a main meal, according to presence or absence of an altered eating behavior (AEB).*

Among adolescents studied, the practice of missing a meal was also frequently found (Figure 1), although only the specific variable of missing breakfast was associated significantly with presenting anomalous eating behavior. Another variable significantly associated with anomalous eating behavior was eating between meals.

Of the subjects studied, 201 (41.7%) indicated that they avoided one or more types of food. Table 3 presents the food types avoided, in order of frequency, and the association of each with the presence of alterations in eating behavior.

Table 3. Groups of Foods Avoided and Association With Altered Eating Behaviors (AEB)

Food Group	Frequency		% AEB	Association With AEB (p)
	No.	% Avoiders		
Milk and dairy products	10	5.0%	4.8%	.90
Fish and shellfish	19	9.5%	6.7%	.17
Meat	19	9.5%	9.7%	.91
Eggs, root vegetables, and pulses	36	17.9%	17.3%	.81
Green vegetables and fruit	43	21.4%	17.3%	.14
Bread and cereals	50	24.9%	33.6%	.005
Oils, fats, and sugar	89	44.3%	51.0%	0.05
Snacks, nuts, and raisins	46	22.9%	25.0%	.45

Table 4. Degree of Worry About Weight Gain and Distribution of Body Fat

	Present		Absent			
	n	95% Cl	*n*	95% Cl	Difference	*p*
Worry about weight gain						
AEB	227	4.43, 5.31	264	4.27, 5.03		.46
A-RB	80	6.31, 7.68	411	4.02, 4.62	1.93, 3.42	.00001
Private school	10	4.23, 8.16	91	3.55, 4.84		.052
Public school	70	6.37, 7.85	320	4.01, 4.70		.00001
B-RB	84	5.65, 7.01	407	4.12, 4.74	1.15, 2.64	.00001
Private school	13	4.20, 7.33	88	3.52, 4.85		.087
Public school	71	5.67, 7.20	319	4.14, 4.85		.00001
Worry about distribution of body fat						
AEB	227	3.51, 4.47	264	2.87, 3.63		.01
A-RB	80	6.10, 7.49	411	2.67, 3.27	3.08, 4.57	.0001
Private school	11	4.26, 8.13	91	2.42, 3.68		.002
Public school	70	6.13, 7.64	320	2.60, 3.29		.00001
B-RB	84	4.89, 6.43	407	2.85, 3.48	1.72, 3.26	.00001
Private school	13	4.06, 7.16	88	2.38, 3.68		.004
Public school	71	4.80, 6.55	319	2.84, 3.56		.00001

AEB = altered eating behaviors; A-RB = anorexia-related behavior; B-RB = bulimia.

In general, we observed associations between altered eating behavior and avoidance of foods high in calories. The proportion of subjects who avoided a specific type of food was high and the notably large number avoiding a variety of food types indicated the prevalence of selective diets.

Use of Purgatives and Excessive Physical Exercise

The use of purgatives is associated significantly with an alteration in eating behavior (CI 95% PR 1.41–2.02). A total of 37 adolescents stated that they had provoked vomiting after eating. The use of laxatives, slimming medications/infusions was reported in five and 35 subjects, respectively.

In the group of adolescents with altered eating behavior, recurrent episodes of voracious eating were frequently (in 56% of cases) accompanied by inappropriate compensatory behavior such as provoked vomiting; abuse of pharmaceutic laxatives, diuretics, and other medications; or excessive physical exercise. Similarly, 311 of subjects reported eating between meals.

Overall, compensatory behaviors (purgatives, diets, or abstinence) were found in 162 subjects (33%) in both types of disorder-related behavior. Of those with compensatory behaviors, 51.9% met the criteria for B-RB, and 49.4% for A-RB. A clear predominance of compensatory behavior was found in females (CI 95% PR 1.79–3.07).

Fear of Gaining Weight and Becoming Obese, and Alteration of the Perception of Body Weight and Figure

The students studied were asked to score, on an analogue scale from 0 to 10, their level of worry with respect to gaining weight and to body fat. The presence of alterations in eating behavior was associated with worry about the distribution of body fat; the degree of worry was significantly higher in subjects with altered eating behavior. However, no differences were found in the degrees of worry with respect to gaining weight between those with and without altered eating behavior, suggesting that worry about aesthetic considerations is more serious than worry about weight in itself .

Worry about gaining weight in relation to the existence or absence of ED-RB (Table 4) showed significantly higher values both for subjects with A-RB (difference CI 95% 1.93–3.42) and those with B-RB (difference CI 95% 1.15–2.64). There was a similar finding for the degree of worry about distribution of body fat.

The level of worry with respect to gaining weight was considerably higher in subjects with A-RB than in those with B-RB. However, with respect to the worry about body fat, greater differences were found between subjects with and without altered eating behavior; the differences were much more significant in the group of subjects with B-RB and much more marked in the case of females. This seems to indicate a greater aesthetic preoccupation in adolescents with

behavior carrying a risk of bulimia and a lower acceptance of excessive body weight in subjects with behavior related to anorexia.

Only in adolescents attending public schools who presented behaviors related to anorexia and to bulimia did we find a greater preoccupation about weight than in subjects not presenting such behaviors. In contrast, the level of worry about body fat was found to be independent of type of school, with values always higher in adolescents presenting behaviors related to eating disorders.

The majority of the adolescents studied (59%) showed a high degree of preoccupation about distribution of body fat or considered their weight not to be correct for their height, even though only subjects with a BMI of $\leq$25 were studied. This alteration in the perception of weight was significantly associated with the presence of altered eating behavior (CI 95% PR 1.22–1.78), but this association was only maintained in the stratified analysis for females (CI 95% PR 1.39–2.33). Thus, the fact that an adolescent girl presents alterations in the perception of her weight–height relationship and of her figure is associated significantly with the presence of anomalous eating behavior.

A total of 18.6% of subjects weighed themselves once or more per month, whereas 5.7% stated that the frequency was once or more per week. This concern about weight was significantly greater among females and, within this group, among those presenting altered eating behavior related to anorexia. No differences were found in preoccupation about gaining weight between subjects with and without altered eating behavior; this seems to be related more strongly related to worry about having a slim figure.

Discussion

Procedures commonly employed for the evaluation of eating habits, attitudes toward food, and use of purgative agents or actions are basically structured interviews, self-completed reports, or questionnaires specific for the different types of disorder in eating behavior studied (14–16). The accuracy of the survey instrument could have been affected by the age range of the responding population (the adolescents themselves). Consequently, although we did not obtain an accurate quantitative estimation of our subjects' food ingestion, we believe the qualitative estimation to be accurate and the dietary patterns obtained, together with the identification of the foods excluded, to be valid.

Given that a self-report questionnaire was used, the existence of organic pathologies could not be excluded. However, no significant alterations were apparent during measurement of the subjects' height and weight. It was also assumed that students healthy enough to attend school could be considered as healthy.

No calculation was made of the energy intake or consumption of macronutrients in absolute terms or as a percentage of total calories, because this was not the objective of the study. In any case, the intraindividual variability would invalidate the correlation of this with bulimic or anorexic behavior. This intraindividual variability in the daily dietary intake could be even greater in studies of adolescents than in those of adults; this could be partly avoided by referring the survey to the subject's intake over several days or on several separate nonconsecutive days. This would be a key factor in subsequent studies to determine whether the dietary restrictions may be responsible for the condition of normal weight or if, alternatively, there coexists in adolescents an unjustified worry about figure or weight and inefficient diets.

To confirm the existence of a voluntary rejection of the intake of food on the part of adolescents, they were asked directly whether they were following a diet, without evaluating the quantity of food ingested; the reason for this was the tendency of adolescents to overestimate small intakes and underestimate large intakes, through known memory mechanisms (the flat slope syndrome) (17). In our opinion, the rejection of food intake is a key factor for the detection of adolescents with altered eating behaviors. This criterion has been widely used for the diagnosis of the clinical syndromes. It appeared in the first anorexia nervosa diagnostic guide proposed by Feighner in 1972, as reported by Aranceta Bartrina et al. (19), although the more recent criteria place special emphasis on the fear of weight gain and the distortion of body image.

In the general population, episodes of compulsive eating are frequent (19) and although the characteristics of the questionnaire used do not confirm the existence of weekly episodes of bulimia, the existence of compensatory behaviors enabled us to differentiate these from simple episodes of compulsive eating, which are known to be frequent in adolescents (20).

The prevalence of ED-RB in the population studied here presents a different pattern from that found by other authors (7,21) in European populations. Those authors found a greater frequency of anorexic

than bulimic behavior in an adolescent population. On the contrary, in the adolescents in our study, similar figures were found for the prevalence of anorexic- and bulimic-related behaviors, and although these are significantly more frequent in females, up to 25% of them were presented by males. The latter finding is in line with results described by various authors (22) who found a greater personal and social acceptance of bulimic behavior compared with acceptance of anorexic behavior; to a certain extent, this would lead to a greater diagnostic frequency of anorexia compared with bulimia among the major eating disorders.

Despite the similarity between the risk factors associated with disorders of eating behavior and those with the complete clinical syndrome (21), despite the existence of similar clinical and psychological correlations between the partial and complete syndromes (23), the relevance of the ED-RB in the subsequent development of anorexia nervosa and bulimia nervosa still has not been definitively established. Studies suggest a continuous model in eating disorders (24).

The prevalence of ED-RB in noninstitutionalized populations seems to be at least double that of the full eating disorders (25) and the incidence of eating disorders in adolescents is put by some authors (26) at 1% on an annual basis. However, it is not known what proportion of ED-RB develops into the complete disorders; it would be even more difficult to predict what risk factors may be involved in their development. In any case, the figures for ED-RB found in our study are extremely worrisome. In our country, Morande et al. (4) found a prevalence of eating disorders, full and partial syndromes, of 4.7% among females and 0.9% among males, with a tendency for the prevalence to increase. Among the possible factors related to this increase are perceived stress in school and family life, hence, the differences found in the level of preoccupation about body fat or the weight–height relationship between adolescents at public and private schools.

Studies such as ours are useful for detecting populations with altered eating behaviors with serious worries about body image or who feel discrepancies between their actual and ideal weight, and among whom it is possible to detect anorexia nervosa– and bulimia nervosa–related behaviors. In those populations, the presence of other risk factors, or a greater convergence of diagnostic criteria, may permit the monitoring, diagnosis, and early treatment of these alterations. The identification of populations with ED-RB allows less costly longitudinal studies to be carried out, to determine the possible evolution of the disorder to anorexia nervosa or bulimia nervosa, together with the risk factors for this evolution.

The wide range of values for the prevalence of ED-NOS given in different papers indicates a need to evaluate the validity of the definition criteria for these disorders and their differentiation from simple altered eating behaviors (21,27). The prevalence of ED-RB found (16.3% for A-RB and 17.1% for B-RB) appears to be substantially different from other samples from similar populations (7,9). The high proportion of adolescents with abnormal eating attitudes may currently be diagnosed as having "eating disorders not otherwise specified" (DSM-IIIR) (28) or atypical eating disorders (DSM-IV) considering that their body mass index was within normal range. For this theoretical perspective to be useful for identifying prevention intervention targets, the definition and classification criteria must be revised, at least to differentiate clearly between anomalous eating behavior (easier to correct) and eating disorder not otherwise specified.

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