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Non-clinical adolescent girls at risk of eating disorder: under-reporters or restrained eaters?

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Abstract

Background: To evaluate the plausibility of self-reported energy intake, Goldberg et al proposed a technique to identify the miss-reporters.

Subjects: After screening 2,967 adolescents by EAT-40 test, 132 at risk of ED and 151 as a control group were studied.

Aim: To determine whether subjects at risk of eating disorders that are identified as under reporters can be considered as UR or in turn as restrained eaters.

Methods: We determined dietary energy intake, body mass index, body satisfaction, physical activity, psychopathology, dietary restraint factor, weight loss and diagnoses of eating disorders. We applied Goldberg's equations to identify under reporters.

Results: 40.9% of girls at risk of eating disorders were identified as under reporters and only 7.3% were in the control group. A total of 64.4% of the Eating Disorders Not Otherwise Specified were under reporters. The body mass index of under reporters was significantly higher than in the other of subjects regardless of whether they were at risk of eating disorders. Girls at risk of eating disorders and under reporter had significantly lower body satisfaction than other groups. Multiple logistic regressions in all subjects showed that the risk of being UR was associated with an increase in the body mass index, increase in dietary restraint scores and weight loss; whereas, that only the body mass index was associated with the control group.

Conclusion: The prevalence of under reporter increases with the severity of the eating disorders several adolescent girls at risk of eating disorder and identified by Goldberg cut-off technique as under reporter may be restricting their intake and therefore they would not be under reporter.

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Key words: Adolescent girls. Under-reporters. Energy intake. Body mass index. Eating Disorders. Dietary restraint factor.

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MUJERES ADOLESCENTES EN RIESGO DE TRASTORNO DE LA CONDUCTA ALIMENTARIA, NO CLÍNICAS: ¿INFRA-DECLARAN O RESTRINGEN EL CONSUMO?

Resumen

Antecedentes: Para validar la ingesta valorada a través de encuestas alimentarias, Goldberg y cols., propusieron ecuaciones para detectar a sujetos que informan mal de su consumo alimentario. **Sujetos:** Después de realizar un cribado entre 2.967 escolares adolescentes mediante el cuestionario EAT-40, se estudiaron 132 mujeres en riesgo de Trastorno del Comportamiento Alimentario (TCA) y 151 como grupo control. **Objetivo:** Determinar si las adolescentes en riesgo de TCA que son identificadas como infra-declarantes de su consumo alimentario (IDCA) pueden considerarse como casos IDCA o por el contrario restringen la ingesta. **Métodos:** Se determinó la ingesta energética, el índice de masa corporal (IMC), la satisfacción corporal, la actividad física, la psicopatología, el factor de restricción dietética, la pérdida de peso y los diagnósticos de TCA. Se aplicaron las ecuaciones de Goldberg para identificar los sujetos IDCA. **Resultados:** El 40,9% de las adolescentes en riesgo de TCA fueron identificadas como IDCA y solamente el 7,3% del grupo control. Un total de 64,4% de los TCA no especificados fueron IDCA. El IMC de las IDCA fue significativamente más alto que en los otros grupos, tanto si estaban o no en riesgo de TCA. Las adolescentes en riesgo de TCA e IDCA presentaron significativamente menor satisfacción corporal que ningún otro grupo. Mediante análisis de regresión logística múltiple en el conjunto de los sujetos se observó que ser IDCA estaba asociado con un aumento del IMC, un aumento de las puntuaciones de restricción dietética y con pérdida de peso; sin embargo, en el grupo control, solamente se asociaba con el IMC. **Conclusiones:** La prevalencia de IDCA aumenta con la severidad de los TCA en las mujeres adolescentes en riesgo de TCA y su identificación como IDCA mediante la técnica de Goldberg podrían ser debidas a la restricción de su ingesta y por tanto no ser IDCA.

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Palabras clave: Mujeres adolescentes. Ingesta de energía. Índice de masa corporal. Trastornos de la Conducta Alimentaria. Factor de restricción dietética.

Introduction

Evaluating an individual's dietary consumption with a sufficient level of validity is complex. Some methods, such as the doubly labelled water technique for estimating energy expenditure are very accurate. However, this technique is too expensive and technically too complex to be used as a reference for validating energy intake estimated by surveys of food consumption in large populations. However, reported energy intake can also be evaluated against presumed energy requirements. Goldberg et al¹ reported a technique for evaluating the validity of data obtained from a dietary survey in which they identified miss-reporters. This technique involved detecting subjects who provided data of poor validity because, consciously or unconsciously, they reported less (under-reporters (UR)) or more (over-reporters) than they actually consumed. These authors proposed that they should be eliminated from the analysis of the data. Miss-reporters are detected by applying, to individual data on reported energy intake, equations based on the principle that energy intake is equal to energy expenditure when the subject's weight remains stable.

Some authors consider that the probability of being a UR increases in obese subjects²⁻⁵ in women with low economic and educational level⁴ and in subjects who have at some time followed a low calorie diet.^{3,6} Anxiety, depression and psychological distress may also influence reporting accuracy. Unfortunately, little is known about how these psychological variables influence self reported energy intake.⁶

It is possible that in certain circumstances, subjects detected as UR actually have insufficient intakes for their needs: for example, those subjects diagnosed with anorexia nervosa. Goldberg's equations cannot be applied in this case because these subjects would have an illness that is characterized by a voluntary restriction of energy intake, and their body weight would therefore be unstable. Therefore they are not UR, but would have a below-requirement intake. However, we wondered what happens in non-clinical adolescents at risk of this disorder.

A high percentage of adolescents in the general population are worried about their weight and their figure, and they go on diets or behave in other anomalous ways to achieve slimness. This dietary symptomatology, which affects between 15-30% of the female population^{7,8} may be the beginning of a pathological continuum, the first link in the eating disorder chain, which transforms into other subclinical symptoms and ends up as the full-blown syndromes of anorexia nervosa and bulimia nervosa.⁹ Besides, the so-called partial subclinical manifestations or Eating Disorders Not Otherwise Specified (EDNOS) may affect 5% of the adolescent population and they are present in the general population without being detected or treated.

Adolescents at risk of an eating disorder (ED) have a greater prevalence of several factors that are associated

with a restriction in energy intake and which are also factors that have been associated with UR, such as a high Body Mass Index (BMI),¹⁰ low body satisfaction and concern about weight.^{10,11} Many studies have shown that overweight children are more likely to be dissatisfied with their body image and that they try to lose weight.¹² Therefore, if the reported energy intake of these subjects is validated by Goldberg's method, it is highly probable that most subjects are detected as URs and so may be eliminated from the data analysis. However, we hypothesize that they are probably restricting their intake and its elimination would achieve to a wrong conclusion about energy intake of the studied population.

To evaluate the validity of reported energy intake and to identify URs, the Goldberg cut-off value has been widely used in adult subjects⁴ and occasionally in adolescents.³ However, although recent studies have evaluated quantitative intake in adolescents at risk of ED,^{7,12,13} none of them have evaluated the plausibility of the data. Since it is essential for all dietary research to estimate the plausibility of self-reported energy intake if conclusions are to be correctly drawn, our aim was to determine whether some subjects at risk of ED that are identified as under reporters (UR) may be considered as restrained eaters instead of UR.

Methods

Subjects

A cross-sectional and multidisciplinary study of ED was carried out in two-phase.

In this paper we used the sample from the second phase of a multidisciplinary study about eating disorders in 2,967 adolescent boys and girls in the province of Tarragona, Spain. In the second phase, we were assessed the energy intake to 132 adolescent girls at risk of ED and 151 control subjects. Girls at risk of ED were selected if their score in the eating attitudes test was ≥ 25 ¹⁴ and exceeded the cut-off in the eating disorders categories of the Youth's Inventory-4.¹⁵ The control group comprised girls with the eating attitudes test score < 10 of the same age and from the same academic year as the girls at risk.

The first phase of our study included all the adolescents in the first and third years of compulsory secondary education ($n = 2,967$) in Tarragona city (population 120,000) as well as from five nearby rural villages of less than 5,000 inhabitants.

Procedure

Permission to carry out the study was obtained from the Catalan government and from the head masters of the participating schools.

In the first phase, all students are administered the eating attitudes test and the anorexia nervosa y bulimia

nervosa subscales of the Youth's Inventory-4 in their classrooms.

The participation was 87.4% (3,122 students). The main reasons for not participating were absence or refusal. Data from students with cognitive disabilities or who had been diagnosed as anorexia and bulimia nervosa were eliminated. Finally questionnaires from 2,967 students were considered valid. Consent for obtaining individual variables by personal interview in the school was obtained from parents.

In the second phase subjects who scored greater than or equal to 25 in the eating attitudes test and who exceeded the cut-off in the ED categories of the Youth's Inventory-4 were selected. The control group was composed of randomly chosen subjects who scored lower than 10 in the eating attitudes test and who were from the same class, age and sex as the individuals at risk. We analysed girls in this study since there was a low frequency of boys at risk of the eating attitudes test. Subjects diagnosed with EDNOS in the control group (n = 7) were eliminated for the statistical analysis.

Measures

Eating Disorders' screening instruments

*Eating Attitudes Test.*¹⁶ This is a self-administered questionnaire used as a screening tool for eating disorders. The questionnaire was validated for Spain by Castro et al.¹⁷ The cut-off score in the original version of this questionnaire was 30, but in this study we used a cut-off score of 25 because it provided more sensitive and specific data for the young people in our population.¹⁴

The eating attitudes test has three factors: dietary restraint (related to an avoidance of fattening foods and a preoccupation with being thinner); bulimia and food preoccupation (related to reflecting thoughts about food and bulimia); oral control (related to self-control about eating and the perceived pressure from others to gain weight).

Total the eating attitudes test score do not discriminate between bulimic and restricting subjects, but the bulimia and oral control subscale do. Then we used the dietary restraint factor because of higher scores on this scale indicate a higher likelihood to engage in the respective dietary behaviour.

Psychosocial evaluation instruments

Body Areas Satisfaction Test. In this study, we used the experimentally adapted Spanish translation of the body areas satisfaction test.¹⁸ This is a self-evaluation test of 9 items that evaluates the degree of body satisfaction that each subject has with respect to each part of their body, on a scale of 1-5 (from very dissatisfied to very satisfied). The total score therefore, ranges from 9 (very dissatisfied) to 45 (very satisfied).

Psychopathology: We administered the Youth's Inventory-4 questionnaire¹⁵ which contains 120 items and corresponds to 18 syndromes of disorders according to Diagnostic and Statistical Manual of Mental Disorders-IV was administered. For this study, we used the anorexia and bulimia sub-scales and the variables: dysthymia, social phobia, major depression and generalized anxiety disorder as dichotomic variables.

Eating disorders diagnosis: The Schedules for Clinical Assessment in Neuropsychiatry¹⁹ is a semi structured interview that provides diagnoses according to International Classification of Diseases-10 and Diagnostic and Statistical Manual of Mental Disorders-IV criteria by a computerized system. We used the computerized eating-disorder diagnoses according to Diagnostic and Statistical Manual of Mental Disorders-IV: anorexia nervosa, bulimia nervosa and EDNOS.

Socioeconomic level. This was evaluated by the Hollingshead Index of Social Position.²⁰ The Hollingshead Index of Social Position distributes social level among five different classes: upper, upper-middle, middle, lower-middle and lower. We recoded them into the following three categories: low socioeconomic level (lower), middle socioeconomic level (lower-middle and middle), and high socioeconomic level (upper-middle and upper).

Family structure questionnaire: The variable "divorce" (or "separation") of parents was used as a binary variable.

Smoking habit: The variable "smoker" was used as a dichotomic variable.

Individual dietary survey

24-hour dietary recall. To determine the dietary intake of adolescent girls we used the 24-hour recall questionnaire^{21,22} on three non-consecutive days, one of which was a non-working day. The personal interviews were conducted at the school by trained dietitians. The interviewers used an extensive photographic file with a wide range of portions of different foods so that the amount of food consumed could be measured more accurately. They also used a standardized table to measure the edible content of the food. In order to calculate the intake of nutrients, we used the French REGAL (Répertoire General des Aliments) food composition table²³ and a Spanish food composition table²⁴ for some typically Spanish foods.

Validity of energy intake estimation. Goldberg's equations use age, sex, weight and height to calculate an individual's basal metabolic rate.²⁵ The mean energy intake is expressed as a multiple of the mean basal metabolic rate estimated which it is denominated PALE (estimated physical activity level = reported energy intake/basal metabolic rate). PALE is compared with the presumed energy expenditure for each subject, which is also expressed as multiple of the basal metabolic rate. The ratio energy expenditure/basal metabo-

lic rate is here referred to as the measured Physical Activity Level (PALm).

We calculated each individual's PALm (measured physical activity level) from their physical activity in leisure and non-leisure time.²⁶ In order to measure habitual physical activity we used the version modified for the Spanish population²⁷ of the questionnaire proposed by Baecke et al.²⁸ to quantify daily physical activity based on work, sport and leisure. We used Goldberg's equation to calculate the confidence limits of PALm.¹ Those adolescents whose PALe were beyond the 95% confidence limits of PALm were considered to be miss-reporters (UR: below the low limit; OR: above the upper limit).

Body Mass Index. Subjects were weighed using a TANITA®, balance, wearing light clothing and without shoes. Height was measured using a fixed measuring tape. BMI was calculated (kg/m²).

Data Analysis

The data were analysed with the SPSS statistical software for Windows (version 13.0). The chi-squared test was used to compare qualitative variables and Fisher's exact test was used when the conditions of application were not fulfilled. Analysis of variance was used to compare averages and Scheffé's test was used to correct increase in error due to multiple comparisons. We used multiple logistic regression (the enter method) to analyse the contribution of one group of variables to the dependent variable we wished to explain i.e.

whether a subject was or was not UR. We made sure that the conditions of application of all statistical tests were respected. The level of significance for all statistical tests was $p < 0.05$ for bilateral contrasts.

Results

Table I shows the general characteristic of the adolescent girls studied. The subjects at risk of ED have significantly higher BMI than the control group. They also report less energy intake, have lower body satisfaction and have higher prevalence of smokers, dysthymia, social phobia and generalized anxiety disorder.

The frequency of UR observed in all participants was 23.0%. Table II showed that the 40.9% (n = 54) of adolescent girls at risk of ED were UR, as opposed to only 7.3% (n = 11) of those in the control group. When separating the at risk of ED into EDNOS diagnoses we observed that 37 subjects have EDNOS diagnoses and 24 (64.9%) were UR ($\chi^2 = 58.827$; $p < 0.001$ -Fisher's exact test-).

We compared the anthropometrical and psychological characteristics by the quality of reported intake and the severity of ED (table III). There were no significant differences between the BMI of the UR according to the severity of ED. However, the ANOVA test with Scheffe correction showed that the BMI of UR subjects, was significantly higher than that of accurate reporters and over reporters, regardless of the severity of the eating disorder.

Table I
General characteristics of adolescent girls at risk of eating disorders and control group

	Control group (n = 151)	At risk eating disorders (n = 132)	p-value	
Age (years)	14.5 (1.1)*	14.5 (1.2)*	NS	
Socioeconomic level (%)				
• Low	22.3	22.2	NS	
• Middle	48.2	52.7		
• High	29.5	25.1		
Body mass index (kg/m ²)	21.7 (3.4)*	23.2 (4.2)*	***	
Energy intake (kcal/day)	2,306 (716)	1,680 (683)	***	
Measured physical activity level (PALm)	1.57 (1.8)*	1.59 (1.7)*	NS	
Body satisfaction (Score)	36.5 (7.7)*	32.2 (8.2)*	***	
Smokers (%)	30.6	42.0	*	
Psychopathology %	Dysthymia	7.6	25.4	***
	Social phobia	20.6	36.1	***
	Major depression	4.1	8.9	NS
	Generalized anxiety disorder	5.3	21.3	***

NS = Not significant; *Mean (standard deviation).

* $p < 0.05$; *** $p < 0.001$.

Table II
Accuracy of eating-reporting according to the risk of eating disorder (rED)

		Control group ^a (n = 151)	At rED ^b (n = 132)
Accuracy of eating-reporting	under reporting	7.3	40.9
	accurate reporting	86.7	56.1
	over reporting	6.0	3.0

a-b: $\chi^2 = 43.69$; $p < 0.001$.

We observed that the URs with severer eating disorders had significantly lower body satisfaction, higher frequency of dysthymia, social phobia, dietary factor score and a weight loss greater than 5% in a month.

We made two multiple logistical regression models—one included all adolescents and the other only the control group—to determine the factors associated with the probability of being a UR. In the model with all the participants (table IV) we observed that the probability of being a UR was higher when the BMI, the dietary restraint factor score and a weight loss > 5% a month increased. In the model that included only the control group (table V), however, the higher probability of being a UR was related to an increase in the BMI.

Discussion

In this paper we analysed data from subjects that were part of a wider study about numerous risk factors of ED in a non-clinical population and which involved adolescents of both sexes. However, here we analysed only adolescent girls because the prevalence of risk of ED in boys was low (7.6%).

We validated the estimated dietary energy intake from two similar groups of adolescent girls from the same city, school, age and socioeconomic level but with different risk of ED. We also tested whether some of the factors associated with URs, such as BMI, body satisfaction, smoking and psychopathological symptoms are different in the subjects depending on the risk of ED. Our aim was to determine whether subjects at risk of ED that are identified as URs may be restrained eaters instead of URs.

We used a double-blind strategy for evaluating food consumption for both groups (i.e. neither the adolescent girls nor the dieticians knew what the risk of ED situations were). The 24-hour recall survey, conducted over 3 non-consecutive days and including one non-working day, is widely used in population studies. This method makes it possible to consider habitual energy intake at a suitable level of validity.²⁹ Although adolescents are not usually very interested in reporting their intake,³⁰ this type of personal interview by trained dieticians is ideal because it is quick and requires little collaboration from the subjects. Besides, the subjects did not know the day that they would be interviewed,

so the interview could not affect their food intake and the possibility of not reflecting their habitual patterns of diet was removed.

Black²⁶ suggests that to improve the sensitivity of the estimation, the PALm should be calculated for each individual according to whether their level of physical activity is light, moderate or intense. Therefore, to measure physical activity, we used a questionnaire applied in Spanish population²⁷ that is suited to epidemiological studies which provide us with more reliable information than using a “light activity” value for all of the subjects.

Some studies have evaluated the accuracy of reported dietary intake in adolescents by Goldberg’s method but no studies have evaluated the accuracy of reported dietary intake in adolescents at risk of ED. The frequency of the UR observed in our sample (23%) is consistent with the 20% observed by Sichert-Hellert et al³¹ in adolescent females and higher than others³. However, in our study we found that the frequency of UR was significantly higher in the group at risk of ED than in the control group. As the two groups were similar except for factors associated with risk of ED, this could mean that the risk of ED is associated with the quality of the information subjects provide about their dietary intake and in particular with their probability of being a UR.

The fact that the percentages of URs depend on the risk of ED can be interpreted in two ways. On the one hand, being at risk of ED could lead to an under-estimation of dietary intake. On the other, it could lead to a real restriction in dietary intake and therefore, they would be restrained eaters.

Under-estimation of dietary intake could be due to memory disorders, belonging to a low sociocultural level,³ or being a smoker.⁵ Likewise, anxiety and psychological distress may also influence reporting accuracy.⁶ However, there is no evidence that these factors were responsible for the different frequencies of URs in the groups analysed in our study. We do not think, therefore, that these factors affected the percentage of UR according to risk of ED.

Numerous authors have found that the BMI of URs is higher than those of other subjects, which suggests that obesity is one of the main predictors of UR.^{2,5} Our data partly support this conclusion since the BMIs of adolescent girls who under-reported their dietary intake were higher than those who did not, regardless

Table III
Relationship between factors associated with quality of self-report intake and severity of eating disorders

		<i>at rED¹</i>			<i>p-value</i>
		<i>Control group^(a)</i> (<i>n</i> = 151)	<i>No EDNOS²</i> (<i>n</i> = 95)	<i>EDNOS³</i> (<i>n</i> = 37)	
BMI (kg/m ²) (Mean, SD)	UR ⁴ (n = 65)	23.9 (2.5)	23.9 (5.0)	25.2 (4.7)	NS
	AR ⁵ (n = 205)	21.1 (2.8)	21.9 (2.8)	23.1 (1.9)	NS
	OR ⁶ (n = 13)	20.3 (3.0)	18.0 (1.2)	–	NS
Body satisfaction (Score) (Mean, SD)	UR (n = 65)	28.6 (5.9)	26.2 (6.6)	19.2 (5.3)	# a-c = *** # b-c = ***
	AR (n = 205)	30.0 (5.9)	27.5 (6.8)	24.1 (6.2)	# a-c = **
	OR (n = 13)	31.5 (7.7)	31.0 (7.5)	–	# a-b = * NS
Smokers %	UR (n = 65)	18.2	50.0	50.0	NS
	AR (n = 205)	28.2	39.3	53.8	NS
	OR (n = 13)	44.4	0.0	–	NS
Dysthymia %	UR (n = 65)	0.0	20.0	45.8	**
	AR (n = 205)	8.4	21.3	46.2	***
	OR (n = 13)	11.1	25.0	–	NS
Social Phobia %	UR (n = 65)	9.1	30.0	50.0	*
	AR (n = 205)	18.3	32.8	46.2	*
	OR (n = 13)	22.2	75.0	–	NS
Major depression %	UR (n = 65)	0.0	13.3	8.3	NS
	AR (n = 205)	3.1	6.6	7.7	NS
	OR (n = 13)	11.1	0.0	–	NS
Generalized Anxiety Disorder %	UR (n = 65)	0.0	20.0	33.3	NS
	AR (n = 205)	6.1	21.3	15.4	**
	OR (n = 13)	11.1	25.0	–	NS
Dietary Restraint Factor (Mean, SD)	UR (n = 65)	2.9 (2.5)	19.1 (7.8)	21.7 (7.5)	# a-c = *** # a-b = ***
	AR (n = 205)	2.2 (2.9)	15.2 (6.7)	19.6 (6.6)	# a-c = *** # a-b = ***
	OR (n = 13)	1.7 (3.5)	14.0 (6.7)	–	# b-c = ** # a-b = *
> 5% weight loss by SCAN ⁷ (%)	UR (n = 65)	27.3	13.3	58.3	**
	AR (n = 205)	8.5	11.7	30.8	NS
	OR (n = 13)	0.0	25.0	–	NS

Analysis of variance, with Scheffé's test for multiple comparisons; * p < 0.05; ** p < 0.01; *** p < 0.001.

¹ At risk eating disorder; ² no Eating Disorders Not Otherwise Specified; ³ Eating Disorders Not Otherwise Specified; ⁴ under-reporters; ⁵ Accurate-reporter; ⁶ Over-reporter; ⁷ Schedules for Clinical Assessment in Neuropsychiatry.

of whether they were at risk of ED or not. This suggests that the effect of BMI on how subjects report their consumption does not explain the different prevalence of UR in the two groups and that this effect is, therefore, independent of ED.

Other factors reported to encourage under-estimation of intake are a concern for one's body image and a desire to lose weight.⁵

Some authors have also found that UR was related to a perceived need for dietary restraint or having dieted at least once.³ Mulvihill et al³² observed a significant

inverse relationship between dietary restraint and reported energy intakes. However, Ard et al³³ consider that dietary restraint does not affect accuracy of recall of energy, fat, carbohydrate, or protein intake, but that it is negatively associated with energy and fat intake. Likewise, Rideout et al³⁴ observed that women with high dietary restraint consumed less energy and chose reduced kilocalorie and reduced fat foods more frequently than those with low dietary restraint scores. Therefore, there is a need to distinguish between an honest record and their possible intake restriction.

Table IV
Factors associated with the probability of being under-reporters in all adolescent girls

	OR	95% CI ¹	p-value
Body mass index kg/m ²)	1,191	1,074-1,321	0.001
Dietary restraint factor (Score)	1,096	1,052-1,142	< 0.001
> 5% loss weight by SCAN	2,505	1,083-5,795	0.032

$\chi^2_{11} = 78.001; (p < 0.001)$

¹ Confidence interval.

Adjusted for: age (in years); socioeconomic level (score); body satisfaction (score); smoker (no = 0, yes = 1); dysthymia (no = 0, yes = 1); social phobia (no = 0, yes = 1); major depression (no = 0, yes = 1); generalized anxiety disorder (no = 0, yes = 1).

Table V
Factors associated with the probability of being under-reporters in the control group

	OR	95% C.I. ¹	p-value
Body mass index (kg/m ²)	1,422	1,117-1,811	0.004
Dietary restraint factor (Score)	1,134	0.868-1.483	0.357
> 5% loss weight by SCAN	5,093	0.651-39.843	0.121

$\chi^2_{11} = 0.044; (p = 0.044)$

¹ Confidence interval.

Adjusted for: age (in years); socioeconomic level (score); body satisfaction (score); smoker (no = 0, yes = 1); dysthymia (no = 0, yes = 1); social phobia (no = 0, yes = 1); major depression (no = 0, yes = 1); generalized anxiety disorder (no = 0, yes = 1).

The adolescents at risk of ED and mainly the EDNOS subjects are characterized by a high dietary restraint factor, for having dieted at least once and for being dissatisfied with their body; therefore, it could explain the greater frequency of UR among the group of adolescents at risk of ED. On the other hand, numerous studies have found that several of the factors that promote ED, particularly a high BMI and a low body satisfaction^{10,11} are also involved in voluntary restrictions of energy intake. In our study, all EDNOS girls were restrictive, except one. All these had also reported weight loss. So we considered that there is more evidence that at least the EDNOS girls were not underestimating their intake but that they consumed a restrictive diet.

Previous studies have observed that the alteration in the dietary pattern precedes the ED and that the energy restriction³⁵ is the greatest factor of risk of ED. Therefore, it is probable that the subjects at risk of ED without EDNOS diagnoses are also restricting their intake. The score on the dietary restraint factor would confirm this similarity with the EDNOS girls. However, prospective studies would allow us to confirm how many of these girls are in such aetiopathological processes.

We considered that the exclusion of URs identified in the validation process would not be appropriate in the case of adolescent girls. Exclusion of URs from

further analysis reduces the number of subjects markedly (23% in our entire sample and 40% in the group at risk of ED). We think that these URs, mainly, adolescent girls, need to be analysed because there is 5% of EDNOS and 20% at risk of ED subjects in the general population. In turn, we may eliminate subjects that restrict their intake and draw erroneous conclusions without detecting nutritional deficiencies.

In summary, we found that the frequency of UR was significantly higher in the group at risk of ED than in the control group. The adolescent girls classified as UR and at risk ED had several characteristics that they were similar to subjects with EDNOS diagnoses. In ED theory, a low body satisfaction, a higher dietary restraint factor and a weight loss > 5% in a month is aetiopathogenically linked to an actual restriction in energy intake.

We believe that when subjects are excluded beyond the 95% confidence limits of Palm according to Goldberg's equation in epidemiology studies in non-clinical adolescent girls, we are probably excluding an important percentage of EDNOS subjects without treatment who are not URs, but they are restrained eaters. We think that these individuals at risk of ED and EDNOS should be identified by a screening test, that they should be asked about their weight loss in the last month and that their dietary restraint factor score should be assessed. We consider that these factors may

also be useful tools for identifying and evaluating under reporting at an individual level in dietary surveys according to the goals of the study.

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