

# VARIABLES ASSOCIATED WITH THE RISK OF EATING DISORDERS IN ADOLESCENCE

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## SUMMARY

It is very important to specify the generic affirmation that eating disorders mainly affect the female population, especially during adolescence.

This study examined three variables associated with the risk of eating behaviour disorders (EBDs): age (early and late adolescence), physical self-concept and engagement in physical activity, as well as the interaction between these factors. This study, to be precise, aimed to clarify the following questions regarding the risk to the non-clinical adolescent population of suffering eating disorders: 1. Whether the risk is higher in the 15-18 age range than in the 12-14 one; 2. the relationship between risk and physical self-concept; 3. the relationship between risk and physical activity; and 4. whether the risk is always higher in women than in men, regardless of the three aforementioned variables (age, self-concept and sporting activity).

There were 740 adolescent participants, 366 men (49.46%) and 374 women (50.54%), aged between 12 and 18 years ( $\bar{X}=14.33$ ;  $SD=1.41$ ).

Three measurements were applied: the *Eating Disorders Inventory (EDI)*, by Garner and Olmsted, the *Cuestionario de Autoconcepto Físico (CAF)* by Goñi, Ruiz de Azúa and Rodríguez (2006), and a questionnaire on physical activity.

Results confirm that, as indicated by significantly higher scores in the EDI, the risk of suffering from eating disorders is higher among women than men, in the 15-18 age range than in the 12-14 one, in those with a low physical self-concept and in those who engage only sporadically rather than regularly in some kind of physical activity.

Therefore, age, self-concept and physical activity therefore become modulating variables of the risk of suffering from eating disorders. Improvement in self-concept and the acquisition of active life habits, factors which modulate the usual gender differences in eating disorders, are the objects of educational intervention; this intervention is particularly important for adolescent females aged between 15 and 18 years.

Consequently, physical self-concept should be included not only in the designs of research projects focusing on the self-perception of the physical-self, but also in the designs of guidance programmes; special attention should be given to those who have developed a low self-perception of both their physical condition and physical attractiveness.

Furthermore, moderate physical activity is clearly better than a sedentary lifestyle; engaging in regular physical activity is highly recommendable, in general, as a way of preventing eating disorders.

Finally, the group most in need of educational support in this field is the population of female adolescents aged between 15 and 18 years. Two criteria are important: a) the promotion of regular physical activity may be one resource, although not the only one, since by itself is not effective enough to eradicate the risk of eating disorders; b) special attention should be given to those who have developed a low self-perception of both their physical condition and physical attractiveness.

**Key words:** Mental health, eating disorders, physical activity, physical self-concept, adolescence.

## RESUMEN

Es bien conocido que los trastornos de la conducta alimentaria (TCAs) afectan ante todo a la población femenina, muy especialmente durante la adolescencia. Ahora bien, ¿hasta qué punto cambia el riesgo de que la población adolescente no clínica padezca tales trastornos en función de variables que pueden ser objeto de atención preventiva?

Este estudio pretendía esclarecer si dicho riesgo: 1. es mayor en el grupo de edad de 15-18 años que en el de 12-14 años; 2. si guarda relación con el autoconcepto físico; 3. si se relaciona con la actividad física practicada; 4. si es siempre mayor en las mujeres adolescentes que en los adolescentes varones con independencia de las tres variables citadas arriba.

Participaron en el estudio 740 adolescentes, 366 hombres (49.46%) y 374 mujeres (50.54%), con edades comprendidas entre los 12 y 18 años ( $\bar{X}=14.33$ ;  $DT=1.41$ ).

Todos los participantes respondieron al *Eating Disorders Inventory (EDI)*, de Garner y Olmsted, un cuestionario destinado a evaluar conductas y pensamientos propios de los TCAs. Todos completaron también un cuestionario acerca de sus hábitos de actividad física. Además, una parte de esta muestra, concretamente 347 sujetos (172 hombres y 175 mujeres), contestó el *Cuestionario de Autoconcepto Físico (CAF)*, de Goñi, Ruiz de Azúa y Rodríguez.

Se llevaron a cabo diferentes análisis estadísticos mediante el programa SPSS 11.5 para Windows: análisis de la varianza factorial, ANOVA de un factor, contraste de medias, análisis de gráficos de perfil para interacciones, así como comparaciones múltiples de Bonferroni.

Los resultados obtenidos permiten afirmar que el riesgo de padecer trastornos alimentarios, tal como lo indican unas puntuaciones significativamente superiores en el EDI, es mayor en las

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mujeres que en los hombres, en el grupo de edad de 15-18 años que en el de 12-14 años, en personas con autoconcepto físico bajo y en quienes realizan actividad física-deportiva de forma esporádica en comparación con quienes la practican de forma habitual.

La insatisfacción corporal y las conductas bulímicas se incrementan, en efecto, en el segundo tramo de la adolescencia con independencia de que la práctica deportiva se realice de forma esporádica o habitual. La insatisfacción corporal, igualmente, aparece asociada con puntuaciones bajas en el autoconcepto físico (tanto en la dimensión de condición física como en la de atractivo físico), pero tal asociación no es significativa en el grupo de 12 a 14 años. Las chicas de entre 15 y 18 años muestran un riesgo significativamente mayor que los chicos. Asimismo, las diferencias de género en trastornos alimentarios, que no son significativas en el grupo de 12-14 años, vuelven a ser claras en éste. Estos datos reclaman prestar atención al grupo de edad de entre 15 y 18 años como etapa particularmente crítica, al menos con respecto a la primera adolescencia (12-14 años).

Por otro lado, se confirma que los trastornos de alimentación conforman una patología propia de mujeres. La percepción del atractivo físico propio tiene, por ejemplo, un comportamiento diferente de un género a otro: no se correlaciona con los trastornos en el caso de los varones pero sí en el de las mujeres. De todos modos, estas consabidas diferencias de género no son las mismas, como ya se ha dicho, en distintos grupos de edad ni tampoco cuando tanto los chicos como las chicas realizan actividad física de forma habitual. En este último supuesto persisten las diferencias entre ambos pero se reducen. La edad y el autoconcepto se convierten, en consecuencia, en variables moduladoras del riesgo de padecer trastornos alimentarios, así como la actividad física.

De los resultados del estudio se desprende que la actividad física moderada se correlaciona con menor incidencia de patología alimentaria, por lo que se convierte en altamente recomendable. No obstante, entre los asuntos que precisan más investigación figura el de la relación entre distintas modalidades e intensidades de actividad física y el bienestar psicológico, más allá de la clasificación dicotómica en adolescentes poco activos *versus* adolescentes activos utilizada en este estudio.

El riesgo, evaluado mediante el EDI, de padecer trastornos alimentarios se ha mostrado fuertemente asociado con el autoconcepto físico medido con el CAF, lo que invita a incluir este último constructo no sólo en los diseños de investigación sobre la autopercepción del yo físico sino también en los programas de orientación, por dos razones básicas. De un lado, la utilización de cuestionarios como el CAF que miden autoconcepto físico puede convertirse en una forma rápida y económica de detectar precozmente sujetos con riesgo de padecer trastornos alimentarios entre población adolescente no clínica. De otro, una forma viable de educar con respecto a los TCAs consiste en fomentar el desarrollo del autoconcepto físico por medio de programas de intervención adecuados.

**Palabras clave:** Salud mental, trastornos alimentarios, actividad física, autoconcepto físico, adolescencia.

## INTRODUCTION

It is well-known (2, 23) that eating behaviour disorders affect mainly the female population, especially during adolescence (32). Nevertheless, it is extremely important

to specify this generic affirmation by testing the variability of the risk of suffering from such disorders in accordance with factors such as age (early and late adolescence), physical self-concept, and engagement in physical activity, as well as the interaction between these factors.

Eating disorders are divided into three diagnostic categories: anorexia nervosa, bulimia nervosa, and atypical eating disorders; however, disorders have many features in common and patients frequently move between them (10).

So far, no clear evolutive guidelines have been established for eating disorders throughout adolescence. Body dissatisfaction (6) and attempts to lose weight (25) have been identified in adolescent girls, aged between 12 and 15 years. The most frequent age for the onset of anorexia nervosa is between 13 and 18 years old (2), while the onset of bulimia nervosa generally occurs at the end of adolescence or the beginning of adulthood (35). In short, it seems that the risk of suffering from eating disorders is greater after early adolescence, although the particularly critical moments of its development are still largely unspecified, despite being of vital interest.

Self-esteem is directly related to mental health (21). On the other hand, poor body image is related to dissatisfaction with one's weight (5), to the tendency to lose weight, and to body dissatisfaction (32). In fact, body dissatisfaction is the main risk factor for suffering from eating disorders since it predisposes the subject to precipitate or maintain anorexia nervosa and bulimia nervosa (1); negative feelings about one's own body may even be the only significant predictor for the onset of some kind of eating behaviour disorders (3). This relationship between the perceived physical-self and eating disorders has been analysed mainly from clinical perspectives of body image, although during recent decades this field has been enriched by studies based on the model more commonly used in educational psychology, i.e., physical self-concept (16).

The relationship between physical activity and eating disorders has been the object of many studies, the majority of which highlight a close association between physical sporting activity and eating problems. Excessive or compulsive physical activity is associated decisively with the pathogenesis and maintenance of such problems (8, 19). The prevalence of these disorders is greater among those who engage in sports such as rhythmic and artistic gymnastics, high diving, figure skating, and ballet, and to those who attach a great deal of importance to body image (13) and top-class sportsmen and women (30). In any case, the symptoms of the disorders seem to be more closely associated with obligatory attitudes to exercise (24) than with the amount of exercise actually

engaged in (28), and with engagement in the sport of jogging more than the number of hours dedicated to other physical activities (26).

Other studies maintain that eating disorders have no relationship whatsoever with either physical activity (20) or, more specifically, with high weekly hours of such activity (18), but rather that sportsmen and women have a better body image than those who do not engage in such activity (11). Such apparently contradictory results may be derived from studies carried out with widely differing methodologies and non-equivalent sample groups. Still no findings indicate that, in general, an active adolescent life is less healthy than a sedentary one (16).

Bearing all this in mind, this study aimed to clarify the following questions regarding the risk for non-clinical adolescent population of suffering from eating disorders: 1. whether the risk is greater in the 15-18 age range than in the 12-14 one; 2. the relationship between risk and physical self-concept; 3. the relationship between risk and physical activity; and 4. whether the risk is always greater in women than in men, regardless of the three aforementioned variables (age, self-concept and sporting activity).

## METHOD

### Participants

There were 740 adolescent participants, 366 men (49.46%) and 374 women (50.54%), aged between 12 and 18 ( $\bar{x}=14.33$  years;  $SD=1.41$ ). The 12 to 14-year old age group was made up by 227 men ( $\bar{x}=13.48$  years;  $SD=0.87$ ) and 248 women ( $\bar{x}=13.49$  years;  $SD=0.88$ ); and the 15 to 18-year old age group was made up by 139 men ( $\bar{x}=15.88$  years;  $SD=0.73$ ) and 126 women ( $\bar{x}=15.84$  years;  $SD=0.70$ ).

Participants were middle class and from families integrated into the social life of their area. They came from three small cities (with between 50 and 100 thousand inhabitants) in the north of Spain and all led a normal school life, attending state schools. None had been previously diagnosed with eating disorders. The total sample scored 20.28 in the Quetelet body mass index, a score that is within normal limits, although it was lower (mean of 19.82) among women than men.

### Instruments

All participants completed the *Eating Disorders Inventory (EDI)*, by Garner and Olmsted (12), a questionnaire designed to assess the behaviours and thoughts typical of EBDs. The instrument consists of eight scales: three which measure behaviours and characteristics directly associated with EBDs, and five which assess personality traits associated with such behaviours. It is also possible

to obtain a global score by adding together those achieved on the questionnaire's eight scales. In this report, however, only those data corresponding to the total score of the EDI are presented, along with the three scales most directly associated with anorexia and bulimia nervosas: *Drive for thinness* (obsession with thinness, excessive concern over weight, intense fear of putting on weight); *Bulimia* (tendency to think about/indulge in uncontrolled binging); and *Body dissatisfaction*. The response method for the EDI consists of a 6-degree Likert scale in which the first three do not score and the fourth, fifth and sixth do so with values of 1, 2 and 3, respectively; higher scores reflect a greater risk or probability of suffering from some kind of EBD. This questionnaire has proved an effective method of assessing the risk of developing some kind of EBD (1). Based on the responses given, numerous studies have been carried out with both clinical samples and subjects with no prior clinical diagnosis (27, 33).

All participants also completed a questionnaire regarding their physical activity habits, made up of items selected from Wold's *Health Behavior in School Children* (34). The responses to this questionnaire enabled us to classify each subject as a sporadic (every once in a while) or habitual (two or more days per week) sportsman or woman.

Furthermore, part of the sample group, specifically 347 subjects (172 men and 175 women) were asked to complete the *Cuestionario de Autoconcepto Físico (CAF)* by Goñi, Ruiz de Azúa and Rodríguez (15). This instrument, originally written in Spanish, consists of 36 items divided between six scales, of which four (*Physical ability*, *Physical condition*, *Physical attractiveness* and *Strength*) are considered dimensions of physical self-concept; the other two scales measure *General physical self-concept* and *General self-concept*. In this report, only data corresponding to the four specific subscales are presented. Reliability coefficients (Cronbach's alpha) for these scales are as follows: *Physical ability*, 0.8488; *Physical condition*, 0.8850; *Physical attractiveness*, 0.8700; *Strength*, 0.8379. These four components accounted for 61.34% of the variance of the questionnaire.

A number of different statistical analyses were carried out using the SPSS 11.5 programme for Windows: factorial variance analysis, one-factor ANOVA, means check, analysis of profile graphs for interactions, and multiple Bonferroni comparisons.

## RESULTS

The data presented in table 1 enable us to compare the responses given by both male and female participants to the EDI. Results are divided into two age groups (12-14 years versus 15-18 years).

TABLE 1. Gender and age differences in EDI responses

EDI subscales	Gender						Gender	Age	Gender*Age			
	Men		Women		12-14 years	15-18 years						
	12-14 years	15-18 years	12-14 years	15-18 years								
DT	$\bar{X}$ ( <i>SD</i> )	3.03 (3.44)	3.03 (3.02)	3.85 (4.09)	4.99 (4.95)		<b>0.000***</b>	0.055	0.056			
B	$\bar{X}$ ( <i>SD</i> )	1.52 (2.43)	2.46 (2.60)	1.10 (2.01)	1.95 (2.52)		<b>0.011*</b>	<b>0.000***</b>	0.796			
BD	$\bar{X}$ ( <i>SD</i> )	4.84 (5.11)	6.94 (5.40)	7.12 (6.44)	10.10 (6.38)		<b>0.000***</b>	<b>0.000***</b>	0.330			
EDT	$\bar{X}$ ( <i>SD</i> )	34.50 (17.22)	38.38 (17.58)	34.84 (18.54)	45.05 (24.30)		<b>0.017*</b>	<b>0.000***</b>	<b>0.031*</b>			

\*p&lt;.05, \*\*p&lt;.01, \*\*\*p&lt;.001

DT=Drive for thinness; B=Bulimia; BD=Body dissatisfaction; EDT=Total EDI.

Significant differences were observed between men and women, with women scoring higher in three EDI subscales: *Drive for thinness*:  $F_{(1, 736)}=21.77$ ,  $p<0.001$ ; *Body dissatisfaction*:  $F_{(1, 736)}=36.63$ ,  $p<0.001$ ; and *Total EDI*:  $F_{(1, 736)}=5.71$ ,  $p<0.05$ . Furthermore, the scores obtained by the older group (15-18 years) were significantly higher in all cases (although only tendentially in the DT scale:  $F_{(1, 736)}=3.70$ ;  $p>0.05$ ) than those obtained by the younger one (12-14 years): *Bulimia*:  $F_{(1, 736)}=24.84$ ;  $p<0.001$ ; *Body dissatisfaction*:  $F_{(1, 736)}=31.88$ ;  $p<0.001$ ; *Total EDI*:  $F_{(1, 736)}=23.11$ ;  $p<0.001$ ). Finally, the interaction between gender and age was significant in the global score for the questionnaire ( $F_{(1, 736)}=4.64$ ;  $p<0.05$ ).

These data corroborate the finding that the risk of suffering from EBDs is greater in women, although this affirmation must be specified further: a) the mean score for the *bulimia* subscale was higher in men; and b) the age-gender interaction in the global EDI score indicates that the female adolescent population has a higher probability of developing EBDs in the higher age range (15-18 years) than in the lower (12-14 years).

Table 2 shows scores obtained in the EDI in accordance with whether the subject in question fell into one of two groups (low score versus medium-high score) in each of the four dimensions of physical self-concept measured by the CAF. These data enable

TABLE 2. Differences in EDI responses in accordance with self-concept and gender

			EDI Subscales							
			DT		B		BD		EDT	
			$\bar{X}$	( <i>SD</i> )	$\bar{X}$	( <i>SD</i> )	$\bar{X}$	( <i>SD</i> )	$\bar{X}$	( <i>SD</i> )
Ability	Low	Man	4.90	(3.40)	2.30	(2.13)	9.90	(4.54)	47.65	(13.88)
		Woman	4.45	(3.12)	2.21	(2.65)	9.66	(5.08)	48.00	(22.79)
	Medium/high	Man	3.62	(3.39)	2.94	(2.74)	8.16	(5.01)	46.06	(15.59)
		Woman	3.53	(3.68)	1.97	(2.29)	8.42	(5.15)	43.97	(19.40)
	Probability	Gender	0.602		0.164		0.992		0.748	
		Self-concept	<b>0.036*</b>		0.598		<b>0.050*</b>		0.298	
		Gender*Self-con	0.731		0.247		0.742		0.652	
Condition	Low	Man	5.21	(3.70)	2.79	(3.02)	10.4	(5.76)	52.36	(18.01)
		Woman	5.31	(3.51)	2.86	(2.62)	10.1	(5.10)	52.81	(24.21)
	Medium/high	Man	3.64	(3.36)	2.87	(2.66)	8.18	(4.89)	45.70	(15.06)
		Woman	3.23	(3.47)	1.76	(2.23)	8.24	(5.10)	42.33	(18.12)
	Probability	Gender	0.779		0.210		0.902		0.617	
		Self-concept	<b>0.001***</b>		0.224		<b>0.016*</b>		<b>0.004**</b>	
		Gender*Self-con	0.654		0.154		0.848		0.513	
Attractiveness	Low	Man	5.23	(4.32)	2.14	(1.93)	9.45	(5.65)	50.73	(13.56)
		Woman	5.59	(4.39)	2.82	(2.40)	11.8	(5.88)	59.68	(23.70)
	Medium/high	Man	3.55	(3.21)	2.97	(2.76)	8.20	(4.87)	45.59	(15.55)
		Woman	3.10	(3.03)	1.76	(2.31)	7.64	(4.43)	39.86	(16.12)
	Probability	Gender	0.926		0.457		0.207		0.506	
		Self-concept	<b>0.000***</b>		0.754		<b>0.000***</b>		<b>0.000***</b>	
		Gender*Self-con	0.402		0.009**		0.040*		0.003**	
Strength	Low	Man	6.29	(5.02)	2.71	(2.21)	6.43	(3.10)	53.43	(16.75)
		Woman	3.70	(3.40)	2.55	(2.51)	8.90	(5.16)	45.95	(16.02)
	Medium/high	Man	3.66	(3.30)	2.87	(2.70)	8.44	(5.03)	45.94	(15.29)
		Woman	3.73	(3.64)	1.87	(2.31)	8.62	(5.16)	44.52	(21.30)
	Probability	Gender	0.091		0.277		0.221		0.246	
		Self-concept	0.082		0.626		0.422		0.245	
		Gender*Self-con	0.074		0.434		0.289		0.429	

\*p&lt;.05, \*\*p&lt;.01, \*\*\*p&lt;.001

DT=Drive for thinness; B=Bulimia; BD=Body dissatisfaction; EDT=Total EDI.

us to analyse the relationships between self-concept and the risk of suffering from eating disorders, while at the same time taking into consideration the interaction between self-concept and gender.

In general, statistically significant differences may be appreciate in responses to the EDI between those subjects grouped together in accordance with their physical self-concept (CAF scores), although neither perception of one's own strength (CAF) nor scores in the bulimia scale respond to this dynamic (all with  $p>0.05$ ). Those with a medium-high self-concept in the condition, ability and attractiveness dimensions show themselves to be more satisfied with their body image (BD) ( $F_{(1, 736)}=5.87$ ,  $p<0.05$ ;  $F_{(1, 736)}=3.87$ ,  $p=0.05$ ;  $F_{(1, 736)}=14.73$ ,  $p<0.001$ , respectively), feel less need to slim (DT) ( $F_{(1, 736)}=10.41$ ,  $p=0.001$ ;  $F_{(1, 736)}=4.44$ ,  $p<0.05$ ;  $F_{(1, 736)}=18.24$ ,  $p<0.001$ , respectively) and have a lower risk of suffering from eating disorders (*Physical condition*:  $F_{(1, 736)}=8.61$ ,  $p<0.01$ ; *Attractiveness*:  $F_{(1, 736)}=26.48$ ,  $p<0.001$ ) than those with a low physical self-concept.

The self-concept-gender interaction was only significant in the case of the physical attractiveness dimension of self-concept in relation to the *Bulimia* (B) ( $F_{(1, 736)}=6.97$ ,  $p<0.01$ ) and *Body dissatisfaction* (BD) scales ( $F_{(1, 736)}=4.23$ ,  $p<0.05$ ), as well as the total EDI score ( $F_{(1, 736)}=9.16$ ,  $p<0.01$ ): women who consider

themselves to be physically unattractive score higher than those with a medium-high self-concept in this dimension (indicating a greater risk of suffering from anorexia nervosa or bulimia nervosa). On the other hand, men obtained statistically similar scores regardless of their self-perceived level of physical attractiveness, indicating that the group with the highest risk is made up by women with a low perceived level of physical attractiveness.

This leads us to the question of whether associations observed between physical self-concept and EBDs vary or remain the same in the two age ranges studied here. In other words, it is interesting to clarify whether age differences found earlier with regard to suffering from eating disorders are mediated by self-concept. Data corresponding to this question are shown in table 3.

These data confirm that: a) the risk of suffering from EBDs is greater during late adolescence and when the person in question has a low physical self-concept; b) the desire to slim (DT scale) remains more or less stable throughout all stages of adolescence, although it is significantly reduced in both age ranges when physical self-concept (one of its components) is medium-high.

On the other hand, hardly any effects were found from the interaction between physical self-concept and

TABLE 3. Differences in EDI responses in accordance with self-concept and age

			EDI Subscales							
			DT		B		BD		EDT	
			$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)	$\bar{X}$	(SD)
Ability	Low	12-14 years	4.42	(3.36)	1.58	(1.79)	8.76	(4.81)	43.39	(16.43)
		15-18 years	4.84	(3.02)	3.12	(2.96)	11.04	(4.71)	53.80	(23.00)
	Medium/High	12-14 years	3.51	(3.49)	2.06	(2.49)	7.18	(5.03)	43.20	(16.65)
		15-18 years	3.66	(3.58)	3.02	(2.60)	9.66	(4.79)	47.42	(18.31)
	Probability	Age	0.578		<b>0.001***</b>		<b>0.001***</b>		<b>0.005**</b>	
		Self-concept	<b>0.039*</b>		0.607		<b>0.039*</b>		0.203	
		Age*Self-con.	0.791		0.423		0.791		0.232	
Condition	Low	12-14 years	4.93	(3.68)	2.07	(1.64)	10.40	(5.89)	47.97	(16.98)
		15-18 years	5.69	(3.37)	3.73	(3.36)	9.88	(4.42)	58.15	(27.15)
	Medium/High	12-14 years	3.43	(3.40)	1.96	(2.50)	6.91	(4.66)	42.36	(16.40)
		15-18 years	3.47	(3.43)	2.89	(2.47)	9.89	(4.88)	46.48	(16.60)
	Probability	Age	0.428		<b>0.000***</b>		0.083		<b>0.001***</b>	
		Self-concept	<b>0.000***</b>		0.196		<b>0.014*</b>		<b>0.006**</b>	
		Age*Self-con.	0.475		0.320		<b>0.014*</b>		0.238	
Attractiveness	Low	12-14 years	4.58	(3.54)	2.30	(1.87)	10.50	(5.36)	52.17	(12.42)
		15-18 years	6.85	(5.10)	3.04	(2.75)	11.81	(6.61)	63.65	(29.05)
	Medium/High	12-14 years	3.43	(3.43)	1.89	(2.50)	6.66	(4.63)	40.91	(16.75)
		15-18 years	3.24	(2.74)	3.03	(2.64)	9.50	(4.25)	45.35	(14.85)
	Probability	Age	0.028*		0.008**		0.002**		0.001***	
		Self-concept	<b>0.000***</b>		0.532		<b>0.000***</b>		<b>0.000***</b>	
		Age*Self-con.	<b>0.009**</b>		0.565		0.249		0.136	
Strength	Low	12-14 years	4.12	(4.11)	2.18	(2.28)	8.18	(5.64)	44.54	(17.63)
		15-18 years	4.00	(2.80)	3.50	(2.65)	9.36	(2.79)	53.00	(10.32)
	Medium/High	12-14 years	3.57	(3.34)	1.93	(2.41)	7.30	(4.89)	42.96	(16.39)
		15-18 years	3.83	(3.58)	2.99	(2.66)	9.94	(4.95)	48.01	(19.85)
	Probability	Age	0.905		<b>0.006**</b>		<b>0.023*</b>		<b>0.026*</b>	
		Self-concept	0.547		0.370		0.858		0.277	
		Age*Self-con.	0.746		0.757		0.380		0.573	

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

DT=Drive for thinness; B=Bulimia; BD=Body dissatisfaction; EDT=Total EDI.

TABLE 4. Differences in EDI scales in accordance with physical activity and age

EDI Subscales	Age				Probability		
	12-14 Years		15-18 Years		Age	Physical Activity	Age* Activity
	Sporadic	Regular	Sporadic	Regular			
DT	4.18 (SD) (3.74)	3.22 (3.81)	4.37 (4.37)	3.57 (3.93)	0.399	<b>0.006**</b>	0.797
B	1.44 (SD) (2.12)	1.25 (2.64)	2.28 (2.61)	2.16 (2.54)	<b>0.000***</b>	0.406	0.861
BD	7.99 (SD) (6.25)	5.39 (5.71)	9.75 (6.24)	7.17 (5.67)	<b>0.000***</b>	<b>0.000***</b>	0.982
EDT	39.41 (SD) (18.95)	33.12 (17.29)	45.56 (24.07)	37.64 (17.32)	<b>0.001***</b>	<b>0.000***</b>	0.596

\*p&lt;.05, \*\*p&lt;.01, \*\*\*p&lt;.001

DT=Drive for thinness; B=Bulimia; BD=Body dissatisfaction; EDT=Total EDI.

the two stages of adolescence studied. We can therefore state that those with a medium-high self-concept in the early stages of adolescence are less at risk from eating disorders.

However, two statistically significant interactions were found. The first indicates that while a low self-perception of one's physical condition does not correspond to a greater degree of *Body dissatisfaction* (BD) in the 12-14 age group, it does in the 15-18 age group ( $F_{(1, 736)}=6.08$ ,  $p<0.05$ ). The second highlights the fact that a low perception of one's physical attractiveness is associated with the *Drive to thinness* scores that are notably higher in adolescents aged between 15 and 18 ( $F_{(1, 736)}=6.88$ ,  $p<0.01$ ).

Responses to the EDI questionnaire are presented below in accordance with engagement in sporting activity combined with age (table 4) and gender (table 5).

Regular sports activity is associated, in three of the four scales, with a lower risk of suffering from eating disorders (EDI scores); however, this association does not interact significantly with age (table 4). In other words, in the *Bulimia* scale no differences were found in either of the two age groups in relation to the frequency with which subjects practice a sport ( $F_{(1, 736)}=0.69$ ,  $p>0.05$ ). In the *Drive to thinness* scale, such differences were only found in the 12-14 age group ( $F_{(1, 736)}=7.63$ ,  $p<0.01$ ). Still, in both the *Body*

*Dissatisfaction* scale ( $F_{(1, 736)}=29.21$ ,  $p<0.001$ ) and the total EDI ( $F_{(1, 736)}=21.31$ ,  $p<0.001$ ), those who practice sports only sporadically scored higher (indicating a greater risk of EBDs). To this, we should add that body dissatisfaction (BD) ( $F_{(1, 736)}=13.63$ ,  $p<0.001$ ) and behaviours classed as bulimic (B) ( $F_{(1, 736)}=20.68$ ,  $p<0.001$ ) increased during the second phase of adolescence, regardless of whether or not the subjects in question engaged in regular sporting activity.

Finally, the total scores obtained in the EDI questionnaire indicate that the risk of EBDs increases with age for both those who practice sports regularly and those who do so only sporadically ( $F_{(1, 736)}=12.02$ ,  $p=0.001$ ). We should also add that, in both age groups, subjects who only sporadically engaged in physical activity had a greater probability of suffering from anorexia or bulimia than those who practice sports regularly ( $F_{(1, 736)}=21.31$ ,  $p<0.001$ ).

Data (table 5) reflect an association, in both men and women, between regular physical activity and lower rates of body dissatisfaction (BD) ( $F_{(1, 736)}=27.73$ ,  $p<0.001$ ), lower scores in the total EDI (lower risk of eating disorders) ( $F_{(1, 736)}=26.90$ ,  $p<0.001$ ), drive to thinness (DT) ( $F_{(1, 736)}=4.49$ ,  $p<0.05$ ) and bulimic behaviours (B) ( $F_{(1, 736)}=7.87$ ,  $p<0.01$ ). This indicates that regular rather than sporadic engagement in some kind of physical activity is healthier for both male and female adolescents.

TABLE 5. Differences in EDI scales in accordance with physical activity and gender

EDI Subscales	Gender				Probability		
	Man		Woman		Gender	Physical activity	Gender* Activity
	Sporadic	Regular	Sporadic	Regular			
DT	3.64 (SD) (2.98)	2.87 (3.34)	4.55 (4.45)	3.95 (4.40)	<b>0.002**</b>	<b>0.034*</b>	0.792
B	2.24 (SD) (2.54)	1.78 (2.53)	1.73 (2.36)	1.09 (2.07)	<b>0.002**</b>	<b>0.005**</b>	0.639
BD	7.89 (SD) (5.15)	5.06 (5.21)	9.36 (6.70)	7.06 (6.27)	<b>0.000***</b>	<b>0.000***</b>	0.583
EDT	42.39 (SD) (17.30)	34.32 (17.11)	42.78 (23.77)	34.41 (17.85)	0.880	<b>0.000***</b>	0.922

\*p&lt;.05, \*\*p&lt;.01, \*\*\*p&lt;.001

DT=Drive for thinness; B=Bulimia; BD=Body dissatisfaction; EDT=Total EDI.

## DISCUSSION

The main aim of this study was to identify some risk factors associated with primary eating disorders and not associated with other psychopathologies, that affect adolescents from non-clinical population aged between 12 and 18 years. Unlike many other studies, participants had not been previously diagnosed with eating disorders; the sample group was made up of students from different schools who lived a normal school life.

More than 30 variables have been reported as putative risk factors for the development of eating disorders. Thin body concern and social pressure are the strongest proximal indicators of their onset (29), but gender, adolescence and high physical activity are also very important risk factors. The construction of a broader theoretical context of risk factors, although not the subject of this article, is nevertheless a relevant current step in this area of research (17). The study of the interaction between diverse risk factors, our specific aim at this time, aims also to systematise available knowledge regarding risk factors for suffering from eating disorders.

Results obtained enable us to affirm that, as indicated by significantly higher scores in the EDI, the risk of suffering from eating disorders is greater among women than men, in the 15-18 age range than in the 12-14 one, in those with a low physical self-concept and in those who engage only sporadically rather than regularly in some kind of physical activity.

A large number of previous research projects have concluded that the period with the greatest prevalence of eating disorders is between 12 and 25 years of age. Data found by this study point to the period between 15 and 18 years as a particularly critical stage, at least in comparison to early adolescence (12-14 years). Body dissatisfaction and bulimic behaviours increase during this period, regardless of whether the subject engages in regular or sporadic sporting activity. Similarly, body dissatisfaction is associated during this period with a low physical self-concept (both in the physical condition and physical attractiveness dimensions), despite the fact that this association is not significant during the 12 to 14 year period. We should also note that during this period, girls are significantly more at risk than boys, and furthermore, gender differences in eating disorders that are not significant during the 12-14-year period become clearly so during the later stage. Regarding prevention and guidance issues, these data urge us to pay attention to adolescents, specially between 15 and 18 years old, and in particular to female adolescents.

Our results, therefore, confirm that eating disorders constitute a pathology of girls and women. The perception of self physical attractiveness, for example, involves a widely different behaviour, from one gender

to the other, which correlates with eating disorders in the case of women, but not in that of men. However, as stated above, these often-recorded gender differences differ from one age period to the next, as well as when the boys and girls in question engage in physical activity on a regular basis (in this last case, gender differences remain, but are greatly reduced). Age, self-concept and physical activity, therefore, become modulating variables for the risk of suffering from eating disorders.

Moderate physical activity is clearly better than a sedentary lifestyle; engaging in regular physical activity is highly recommendable, in general, as a way of preventing eating disorders. The situation of those who engage in physical/sports activity in a compulsive or highly competitive manner, however, is quite different. In such cases, the challenge is how to channel their excess activity (4). This study advocates programs aimed not only at increasing physical activity, but also at maintaining body satisfaction (22). In this sense, one of the aspects that require further research is the relationship between different types and intensities of physical activity and psychological well-being (14) from a perspective that goes beyond the dichotomous classification used in this study of adolescents as either non-active or active subjects.

The risk of suffering from eating behaviour disorders has been found to be closely associated with physical self-concept. This suggests that the latter construct should be included not only in the designs of research projects focusing on self-perception of the physical-self, but also in designing of guidance programs, for two basic reasons. On the one hand, the use of questionnaires such as the CAF, which measure physical self-concept, may prove a quick and economic method of ensuring the early detection of subjects among the non-clinical adolescent population at risk of suffering from eating disorders. And on the other, one viable way of preventing EBDs is to promote the development of physical self-concept through appropriate intervention programs.

The group most in need of educational support in this field is the population of female adolescents aged between 15 and 18 years. This study provides two basic criteria in this respect: first, that the promotion of regular physical activity may be one, although not the only, resource, since by itself is not effective enough to eradicate the risk of eating disorders; and second, that special attention should be paid to those who have developed a low self-perception of both their physical condition and physical attractiveness.

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