

# Validation of the Disordered Eating Attitude Scale for adolescents

*Validação da Escala de Atitudes Alimentares Transtornadas para adolescentes*

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## ABSTRACT

**Objective:** To perform the psychometric evaluation of the Disordered Eating Attitude Scale (DEAS) for adolescents. **Methods:** Sample consisted of 1,119 Brazilian adolescents (12-18 years old; 59.6% female) studying at technical schools in São Paulo state-Brazil, who answered an online survey with the DEAS, the Eating Attitude Test (EAT-26), and the Restraint Scale (RS). The internal consistency of the DEAS was assessed using Cronbach's alpha. The convergent validity of DEAS was evaluated by means of Pearson's coefficient correlation with EAT-26 and RS. The test-retest reliability was evaluated using a sub-sample of 61 adolescents. Known-groups validity was determined by comparing female student mean scores with scores of 33 female adolescents with eating disorders. **Results:** The reliability of the DEAS was 0.79. EAT-26 and RS scores were positively correlated with DEAS scores (EAT: 0.78 for females and 0.59 for males,  $p < 0.001$ ; RS: 0.63 for females and 0.48 for males,  $p < 0.001$ ). The DEAS total and subscale scores differentiated students and patients with eating disorders ( $p < 0.001$ ). The intra-class correlation coefficient for test-retest reliability was 0.87. **Conclusion:** Results indicate that the DEAS adolescent version showed good internal consistency, convergent validity, known-groups validity, and test-retest reliability, suggesting its potential in identifying disordered eating attitudes among adolescents. It could also be helpful in identifying adolescents at risk from eating disorders, assisting in prevention programs.

## Keywords

Eating disorders, feeding behavior, adolescent, psychometrics, validation studies.

## RESUMO

**Objetivo:** Realizar a avaliação psicométrica da Escala de Atitudes Alimentares Transtornadas (EAAT) para adolescentes. **Métodos:** A amostra foi composta por 1.119 adolescentes (12-18 anos; 59,6% do sexo feminino) estudantes de escolas técnicas do estado de São Paulo, que responderam *online* à EAAT, ao Teste de Atitudes Alimentares (EAT-26) e à Escala de Restrição (RS). A consistência interna da EAAT foi avaliada usando o *alpha* de Cronbach e a validade convergente por meio do coeficiente de correlação de Pearson com o EAT-26 e a RS. A confiabilidade teste-reteste foi avaliada usando uma subamostra de 61 adolescentes. A validade *known-groups* foi determinada pela comparação dos escores médios de estudantes do sexo feminino com os escores de 33 adolescentes do sexo feminino com transtornos alimentares. **Resultados:** A consistência interna foi de 0,79, e as pontuações no EAT-26 e na RS estiveram

Recebido em  
10/9/2015  
Aprovado em  
9/12/2015

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positivamente correlacionadas com a pontuação da EAAT (EAT: 0,78 para o sexo feminino e 0,59 para o masculino,  $p < 0,001$ ; RS: 0,63 para o sexo feminino e 0,48 para o masculino,  $p < 0,001$ ). O escore da EAAT diferenciou estudantes e pacientes com transtornos alimentares ( $p < 0,001$ ). O coeficiente de correlação intraclassa na confiabilidade teste-reteste foi de 0,87.

### Palavras-chave

Transtornos alimentares, comportamento alimentar, adolescente, psicométrica, estudos de validação.

**Conclusão:** A versão da EAAT para adolescentes mostrou boa consistência interna, validade convergente, *known-groups* e confiabilidade teste-reteste, sugerindo o seu potencial na identificação de atitudes alimentares transtornadas entre adolescentes. Ela pode, portanto, ser útil na identificação de adolescentes com risco de transtornos alimentares, auxiliando em programas de prevenção.

## INTRODUCTION

Eating disorders (EDs), such as anorexia nervosa (AN), bulimia nervosa (BN) and other specified feeding and eating disorders (OSFED) are psychiatric illnesses characterized by eating and body image disturbances<sup>1</sup>. Some studies indicate an increasing trend in the incidence of AN and BN, especially in young people between 15 and 24 years<sup>2-4</sup>. Occurrence of EDs, especially AN, in prepubertal children has caught the attention of the scientific community in recent years<sup>5-7</sup>.

The presentation of EDs in childhood and adolescence shows peculiarities in comparison to adults<sup>2-9</sup>. Younger patients tend to follow more drastic and severe dietary restrictions<sup>10</sup>, and compensatory behaviors tend to be non-purgative (e.g., excessive exercise)<sup>3,6</sup>. In older adolescents of 15-16 years, purging behaviors such as vomiting and laxative abuse are more common<sup>2,3,6</sup>.

Although not as extreme as EDs, disordered eating behaviors are more common and include unhealthy attitudes to lose or control weight, such as thinking obsessively about food and calories, increased anger and irritability when hungry, being unable to select what to eat, using food to compensate for psychological problems, eating until feeling sick, and presenting dysfunctional myths and beliefs about eating and weight<sup>11</sup>. Disordered eating could be maintained<sup>12</sup> or even become worse over the years of adolescence<sup>13</sup> and can indicate partial syndromes or risk behavior for ED<sup>14</sup>, and the prevalence of ED partial syndromes is at least double the prevalence of the complete syndromes<sup>15</sup>.

Most evaluations of disordered eating among teenagers use instruments focusing on ED symptoms, such as restriction, binge eating, and purging behaviors<sup>14</sup>. Prominent scales include the Eating Attitude Test (EAT)<sup>16</sup>, and the Bulimic Investigatory Test (BITE)<sup>17</sup>. The BITE was developed for screening and assessing the symptoms and severity of BN, while the EAT was initially developed for the diagnosis of AN, but was found to be useful in detecting clinical cases of ED in high-risk populations and identifying individuals who show abnormal preoccupations with food and weight<sup>11</sup>. The more widely used Eating Disorder Inventory<sup>18</sup> has also been used in prospective studies of ED risk, but its subscales focus on ED symptoms (bulimia, body dissatisfaction) and psycholo-

gical domains such as ineffectiveness, interpersonal distrust, interoceptive awareness, and maturity fears.

Eating attitudes encompass beliefs, thoughts, feelings, behaviors, and relationships with food (related to the ways individuals deal with food in terms of food control, food refusal, guilt, anger, desire, and shame)<sup>19</sup>. The aforementioned instruments, therefore, have a limited scope because they do not evaluate the relationship with food, or general feelings and beliefs about food and eating. Considering the wide spectrum of experiences related to eating, is necessary to evaluate a number of different aspects of eating attitudes and behaviors. EDs could be considered as the maximum expression of disordered eating, and most instruments focus on ED symptoms. However, more subtle attitudes to eating could also be damaging if they are not properly evaluated and identified. In order to explore these attitudes, specific, validated instruments are needed.

There are few validated instruments to evaluate disordered eating and eating attitudes in Brazilian-Portuguese (such as EAT<sup>16</sup> and BITE<sup>17</sup>). In Brazil, studies examining EDs in teenagers are mostly locally conducted and few of them with probabilistic samples<sup>14,20,21</sup> they have mainly used validated versions of the EAT-26<sup>16</sup> and BITE<sup>17</sup>. Considering this context, the Brazilian-Portuguese version of the Disordered Eating Attitude Scale (DEAS) was developed using Brazilian female college students<sup>19</sup>. The scale was also validated for female college students in English<sup>22</sup>, Spanish<sup>23</sup>, and Japanese<sup>24</sup>, and for a male adult population<sup>25</sup>. DEAS demonstrates good psychometric properties and could be useful for studying eating attitudes in different populations and accent differences among diverse groups, including clinical ones. Potential applications for the DEAS include screening for disordered eating, and as a predictor of treatment for ED, since eating attitudes are good predictors of food intake, and changing disordered attitudes is important for successful treatment of ED<sup>19</sup>.

Given that the evaluation of adolescents requires an adaptation of methods to meet age-related levels of emotional and cognitive development<sup>26</sup>, the objective of this study was to evaluate psychometric properties of the DEAS for adolescents, exploring the results of disordered eating among them, and comparing results among students and eating disorders patients.

## METHODS

This is an exploratory study, using a transversal design aimed to validate the DEAS for adolescents, performed within 2009–2011, conducted with two groups: students in technical schools (Group 1) and eating disorders patients (Group 2). These two groups were investigated to evaluate the ability of DEAS to differentiate attitudes between them (known-groups validity).

### DEAS version for adolescents

The original DEAS was developed and validated according to psychometric recommendations for adult women<sup>19</sup>. It consists of 25 questions rated on a Likert scale. The total possible score ranges from 37 to 190<sup>19</sup> (higher scores indicate more disordered attitudes). The questions are distributed in five subscales: (1) Relationship with food; (2) Concerns about eating and body weight gain; (3) Restrictive and compensatory practices; (4) Feelings toward eating; and (5) Idea of normal eating<sup>16</sup>.

In order to validate the DEAS for adolescents, the scale was evaluated by a group of experts on adolescence (dietitians, psychiatrists, and psychologists). They were asked to provide online advice about adapting the DEAS questions and suggested changes on just two items. It was recommended that Question 4 – “Have you ever spent one or more days without eating or having only liquids because you believed you could lose weight?” – should be changed to “Have you ever spent one or more days without eating or *dieting* using only liquids because you believed you could lose weight?” The word *having* was changed to *dieting* to make the meaning clearer. For question 12 (“When you eat more than usual, what is your behavior afterwards?”), one of the answer options was changed from “Use some kind of compensation, such as physical activity, vomiting, laxatives, and diuretics,” to “Do something to compensate. What?” This change was made to avoid inciting purgative behaviors. The other response options for this item are: “a) Restart eating as usual; b) Assume you have lost control and keep eating even more, c) Decide to go on a diet to compensate.” The multiple response options for this item allowed the choice of compensation behaviors other than diet.

A pretest of the questionnaire was conducted with five adolescents, who did not have any problems in understanding the instrument (language and comprehension), and were able to complete the questionnaire within reasonable time. All other questions (besides 4 and 12) and scores of the DEAS were maintained as for adults<sup>19</sup>.

This evaluation of the DEAS for adolescents focused on analyzing the psychometric properties regarding internal consistency, convergent validity, test-retest reliability and known-groups validity.

## Participants and study design

### Group 1

Validation studies recommended at least 10 individuals per question of an instrument<sup>27</sup>. Considering that, a minimum of 250 students were required. A sample figure was also calculated at GPower software (by a significance level of  $p < 0.05$ , effect size 15% and observed power of 80%) for difference between two independent means by *t* test resulting a *N* of 1102.

A study partnership was set up with São Paulo State Technical Schools board; the research was publicized on their website in 2009. All students were considered eligible; those interested clicked the link and answered the questions hosted at survey monkey secure website. From a possible population of 39,000 students from São Paulo's 425 technical schools, 667 females and 452 males completed the survey ( $N = 1,119$ ), which consisted of the DEAS, EAT-26<sup>16</sup>, and Restraint Scale (RS)<sup>28</sup>, and self-reported age, weight, and height (it was self-reported since they answered the survey online).

### Group 2

Patients with EDs are known to have a high frequency of eating attitude problems, thus the known-groups validation method<sup>29</sup> was used to compare female adolescent students' (those from Group 1) scores with scores from patients with EDs (Group 2). A higher score was expected for ED patients, thereby verifying the known-groups validity of the scale.

The patients with EDs were recruited from an outpatient and inpatient Eating Disorder Program, São Paulo University. The following inclusion criteria were used for this Group: diagnosis of total or partial syndromes of AN or BN according to the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)<sup>30</sup> – in validity at the time of the evaluation – verified by a psychiatrist by means of both clinical interview and the Development and Well-Being Assessment (DAWBA)<sup>31</sup>; female and maximum 18 years of age; and no specialized psychiatric, psychological, or nutritional treatment within the past month. Exclusion criteria included: older than 18 years; psychosis; drug or alcohol abuse, or addiction. It was defined to include just female patients, because the number of male ones was so limited.

The participants drawn from the EDs unit included all individuals who met the inclusion criteria at the time of performing the analysis ( $n = 58$ ); they completed the DEAS during pretreatment evaluation and had their weight and height measured by a dietitian. Of the total patients from the Eating Disorder Program who agreed to participate (57%), 31 were diagnosed with AN, and 2 with BN.

For the known-group analysis, female students from Group 1 who scored equal to or above 21 on the EAT-26<sup>16</sup> were not included in the data, since this score indicates symptoms of an ED<sup>16</sup>.

To analyze the scale's convergent validity, scores on the DEAS were correlated with scores on two other measures of eating attitudes, which were chosen because they measure different dimensions of eating attitudes and have been validated in Brazil. Briefly, scores obtained by the current participants (Group 1) on the DEAS were correlated with scores obtained on the Portuguese versions of the EAT-26<sup>16</sup>, the most widely used instrument for assessing ED risk behavior, presenting adequate internal consistency (Cronbach's  $\alpha = .82$ ) for adolescents in Brazil<sup>32</sup>; and the RS<sup>28</sup>, one of most used scales to assess dietary restraint, presenting proper discriminant validity [ $F(2, 92) = 34.7, p < .001$ ] and test-retest reliability ( $\rho = .64, p < .001$ ) for use in Brazil<sup>28</sup>. The DEAS was considered to possess convergent validity if it had statistically significant, positive correlations with them.

To evaluate test-retest reliability from all students that provided a valid e-mail address in the first online participation, 30% ( $n = 335$ ) were sampled and received another e-mail approximately one month later, inviting them to complete the DEAS scale again on its own; 67 students (46 females and 21 males) returned completed scales for the test-retest analysis.

The ethics committee of the Public Health School of the University of São Paulo approved the study (Protocol 1351/06). Patients gave written consent to participate; and for students the consent was obtained with their agreement at the beginning of the online survey, checking "I agree" after all explanations about the research including the secrecy.

### Statistical analysis

Statistical analyses were performed using SPSS 18.0 (SPSS Inc., Chicago, Illinois, USA). The significance level adopted was 0.05. Normality was evaluated using the Shapiro-Wilk test, and non-normal variables were standardized as z-scores.

The internal consistency of the scale and subscales was evaluated using Cronbach's alpha. To assess the scale's convergent validity, Pearson's correlation coefficient ( $r$ ) was used to calculate the correlation between DEAS scores and scores

on the EAT-26<sup>16</sup> and RS<sup>28</sup>. Test-retest reliability was evaluated using the intra-class correlation coefficient (ICC).

Known-groups validity was assessed by the  $t$ -test to verify differences between Groups 1 and 2 scores on the DEAS. For this analysis, only female adolescent participants were included, and those who scored  $\geq 21$  on the EAT-26 ( $n = 133$ , 19.94% of girls) were not included. To evaluate the influence of body mass index (BMI) and age in this analysis, a General Linear model (GLM) was conducted to control for these variables. BMI was calculated using self-reported weight and height according with formula body weight (kilogramas)/body height (meters)<sup>2</sup>.

Male and female students with EAT-26 scores of  $< 21$  (no ED risk behavior) and  $\geq 21$  (ED risk behavior) were compared using Student's  $t$ -test.

In order to explore students disordered eating attitudes obtained from the DEAS evaluation, the DEAS total and subscales scores were compared by sex using Student's  $t$ -test.

## RESULTS

Student profile by gender is shown in Table 1. The mean ages of male and female were similar, but the samples differed on BMI ( $p < .001$ ): higher for males than for females. Age ranged from 12 to 18 years (median = 15). Most participants (42.2% of the females and 44.1% of the males) were in the first year of high school. In terms of nutritional status, 82.5% of females were within the normal weight range compared with 67.6% of males; 15.0% of females and 28.2% of males were overweight; 2.6% of females and 4.4% of males were underweight, according to percentile IMC-age<sup>33</sup>.

There was a difference in DEAS total, and subscales 2, 3 and 4 scores between male and female students (Table 1), with higher mean for females.

As expected, ED patients (Group 2) had lower BMIs (Table 2); 45.5% were underweight compared with 2.6% of female students without ED risk behavior (EAT-26 score  $< 21$  for Group 1); 51.5% of patients and 82.5% of studen-

**Table 1.** Age, body mass index (BMI) and the Disordered Eating Attitude Scale (DEAS) scores of Brazilian adolescents ( $n = 1,119$ ) by gender

	Girls ( $n = 667$ ; 59.61%) average (Standard Deviation)	Boys ( $n = 452$ ; 40.39%) average (Standard Deviation)	p value
Age	15.39 (0.92)	15.44 (0.92)	$p = 0.277$
BMI	21.15 (3.34)	22.14 (4.27)	$p < 0.001$
DEAS total score	64.30 (17.60)	60.93 (15.29)	$p < 0.001$
1) Relationship with food	23.85 (8.60)	23.09 (7.21)	$p = 0.121$
2) Concern about food and weight	7.41 (3.53)	6.40 (3.08)	$p < 0.001$
3) Restrictive and compensatory behaviors	4.61 (2.83)	3.87 (2.05)	$p = 0.001$
4) Feelings toward eating	4.54 (2.72)	4.11 (2.31)	$p = 0.005$
5) Idea of normal eating	22.03 (6.20)	22.08 (5.40)	$p = 0.870$

ts were at normal weight range; and 3.0% of patients and 15.0% of students were overweight. Patients' DEAS scores (total and all subscales) were significantly higher than were those of female students (Table 2). Even the age and BMI being different between girls without ED risk behavior (from Group 1) and patients (Group 2), the difference – tested by GLM – between groups remained.

The comparison of DEAS scores between students with and without ED risk (evaluated by the EAT-26) showed that those with a risk of ED scored higher on the DEAS total and subscales 1, 2, 3 and 4 (Table 3).

Cronbach's alpha indicated internal consistency for the DEAS items (0.81 for females, 0.71 for males; overall alpha 0.79).

DEAS score positively correlated with EAT-26 and RS scores, although less so for boys (Table 4).

The sample assessed for test-retest reliability did not differ on age, nutritional status, or gender compared with original samples (data not shown). The results showed that the mean DEAS score for the original test was 54.70 (SD = 21.31), while the retest mean score was 65.08 (SD = 21.39). The intra-class correlation coefficient for test-retest reliability was .87, indicating a strong concordance.

**Table 2.** Age, body mass index (BMI) and the Disordered Eating Attitude Scale (DEAS) scores – covariate averages – of female Brazilian adolescents without Eating Disorders risk behavior and Eating Disorders patients

	Adolescent girls – EAT < 21* (n = 534) average (Standard Deviation)	Eating disorders – Patients (n = 33) average (Standard Deviation)	p value
Age	15.40 (0.91)	14.77 (1.56)	p < 0.001
BMI	20.85 (3.32)	16.43 (2.74)	p < 0.001
DEAS total score	58.43 (11.00)	103.09 (35.30)	p < 0.001
1) Relationship with food	21.30 (6.06)	31.94 (13.16)	p < 0.001
2) Concern about food and weight gain	6.29 (2.23)	13.70 (5.85)	p < 0.001
3) Restrictive and compensatory behaviors	3.82 (1.80)	11.91 (5.63)	p < 0.001
4) Feelings toward eating	3.84 (1.93)	10.03 (4.36)	p < 0.001
5) Idea of normal eating	22.02 (6.08)	35.52 (13.32)	p < 0.001

\* Score less than 21 in the Eating Attitude Test (EAT-26), which means no eating disorder risk behavior.

**Table 3.** Disordered Eating Attitude Scale (DEAS) scores of Brazilian adolescents with and without Eating Disorders risk behavior

	Adolescents with Eating disorder risk (EAT ≥ 21)* (n = 183; 16.35%) average (Standard Deviation)	Adolescents without Eating Disorder risk (EAT < 21)* (n = 936; 83.64%) average (Standard Deviation)	p value
DEAS total score	86.34 (19.38)	58.37 (11.64)	p < 0.001
1) Relationship with food	33.78 (9.33)	21.54 (6.04)	p < 0.001
2) Concern about food and weight gain	11.63 (4.22)	6.10 (2.30)	p < 0.001
3) Restrictive and compensatory behaviors	7.37 (3.77)	3.71 (1.72)	p < 0.001
4) Feelings toward eating	7.02 (3.57)	3.85 (1.94)	p < 0.001
5) Idea of normal eating	22.26 (6.16)	22.01 (5.83)	p = 0.602

\* Eating Attitude Test (EAT-26).

**Table 4.** Disordered Eating Attitude Scale (DEAS) correlation with the Eating Attitude Test-26 (EAT) and the Restraint Scale (RS) in evaluation with Brazilian adolescents (n = 1,119)

DEAS	Pearson Correlation Coefficients with EAT		Pearson Correlation Coefficients with RS	
	Girls	Boys	Girls	Boys
	n = 667	n = 452	n = 667	n = 452
DEAS total score	0.78*	0.59*	0.63*	0.48*
1) Relationship with food	0.71*	0.55*	0.63*	0.43*
2) Concern about food and weight gain	0.76*	0.60*	0.55*	0.47*
3) Restrictive and compensatory behaviors	0.65*	0.70*	0.50*	0.45*
4) Feelings toward eating	0.57*	0.37*	0.43*	0.34*
5) Idea of normal eating	0.32*	0.21*	0.25*	0.17*

\* p < 0.001.

## DISCUSSION

This study assessed the psychometric properties of the adolescent version of the DEAS and shows that the scale presented good internal consistency for girls and boys, appropriate convergent validity with similar scales used in the same field, and good test-retest reliability. The DEAS was also able to differentiate between students and patients with EDs.

The values of Cronbach's alpha were similar to those found for the original version of the DEAS for female adults (.75)<sup>19</sup> and its English, Spanish, and Japanese versions (.76, .70, .76, respectively)<sup>22-24</sup>. Strong concordance between test and retest scores showed scale reliability, similar to the English, Spanish, and Japanese versions of the DEAS<sup>22-24</sup>; however, the reliability has not yet been presented for the Brazilian adult version of the scale.

In studies of adults, convergent validity has been shown for the DEAS, the EAT-26, and the RS; this study confirmed this convergent validity, although correlations between the scores were weaker for male students. It might be stressed that these large correlations among the scales showed that they "walk together," as expected by their theoretical characteristics; however, this does not mean that they are evaluating the same construct.

The known-groups validity showed that the scale was able to distinguish between ED patients and adolescents without ED risk just as well as the adult version of the DEAS for a female adult sample<sup>19</sup>. Given that the investigation of eating attitudes among teenagers needs scales that have been adapted for their age and developmental stage<sup>26</sup>, the results of this study showed that the DEAS was appropriate for the use of adolescents.

Disordered eating habits, such as diet, fasting, to skip meals, overeating, use meal replacements and compensatory methods are considered "epidemic" among teenagers<sup>34,35</sup>. Both eating patterns and disordered eating behavior must be assessed in teenagers and be focus of education and prevention programs in order to not assumed them as just "proper of the stage of life". Many adolescents feel that healthy eating is not a primary concern during their teenage years<sup>36,37</sup>. The eating behavior of adolescents might change throughout the teenage years; studies of eating behavior in this cohort usually focus on food intake and patterns, but not on attitudes, beliefs, thoughts, and feelings, which is what the DEAS is able to investigate<sup>36,37</sup>. We believe that the DEAS items are suited to the full range of cognitive levels that characterize the adolescent age range.

The students with ED risk behavior scored higher on the DEAS in the present study, a finding that mirrors previous work on Brazilian female college students<sup>38</sup>. This result was expected, since the EAT-26 correlates positively with the DEAS. It may be that the DEAS could be used as an instrument for screening purposes to identify disordered eating

attitudes in non-clinical populations. However, in order to use the scale for screening it would be prudent to have a suitable cut point. Of course, the possibility of using the DEAS to screen for ED symptoms must be balanced against the fact that it does not assess factors related to body image and teasing – among others – these factors are already addressed by other instruments in ED field. The focus of the DEAS is on eating-specific issues within the general construct of "eating attitudes".

Brazil lacks epidemiological data about disordered eating<sup>20,21,39</sup>; most studies use the EAT-26<sup>14</sup>, but this instrument does not properly evaluate the construct of disordered eating or dietary practices<sup>40</sup>. Therefore, an adequate and valid instrument such as the DEAS will enable the development of suitable studies investigating EDs in young Brazilians. Epidemiological studies show that EDs in childhood and adolescence result in serious morbidity for patients, family, and society; if they are not properly identified and treated, they can become lifelong problems<sup>12,13</sup>. Identifying disordered eating is the first step in properly evaluating ED behavior and symptoms. Moreover, the evaluation of eating attitudes along with treatment may be an important factor in treatment response.

It is known that ED and disordered eating are more prevalent among women<sup>4</sup>; however, differences in male and female attitudes to eating still need to be further explored. The present study found that male and female students scored differently on the DEAS score – with exception of "Relationship with food" (1) and "Idea of normal eating" (5). The subscale 1 explores attitudes related to the ways individuals deal with food in terms of food control, food refusal, guilt, anger, desire and shame. Could be thought that although there are differences in body image dissatisfaction between men and women – men are more concerned about body shape and increasing their muscle mass as opposed to the search for thinness<sup>41</sup>, both genders could relate similarly to food control, refusal, guilt, anger and desire besides different worries about body (or possible different objectives in relation to body control). Regarding the subscale 5, the similarity makes sense if we have in mind the current cultural concept about food and eating; that is rigid, ambiguous and quite irrational for both sex – the same argument could be use regarding the result of no difference in subscale 5 between students with and without ED risk.

The result of weaker internal consistency of the DEAS among the males – and also weaker correlations among EAT-26 and RS scores for male students compared to female might be explained by the fact that the scale was originally developed for women. The possibility that men's relationship with food is less understood because instruments on eating are "women-biased" and do not reflect food issues experienced by men are discussed by a study using a preliminary version of the DEAS to compare adult women and

men with ED<sup>42</sup>. An analysis of the psychometric properties of the DEAS for young adult males called attention to the fact that a specific scale to evaluate eating attitudes among boys may be required<sup>25</sup>. Future research should conduct a focus group with adolescent males (without and with ED) to sample opinions about which DEAS questions reflect their attitudes, and to discuss the possibility of adapting the scale. These methods could improve the diagnosis and efficacious treatment of disordered eating in this population and reduce the possible evaluation bias of inappropriate questionnaires. The more appropriate the measures, the earlier the identification of cases. Improving the diagnosis of disordered eating will lead to early treatment and better outcomes.

Considering that adolescence is a phase marked by intense and deep biological, social, and psychological changes, eating patterns could protect or put them at risk for ED, obesity, and chronic diseases, so it is important to evaluate not just eating intake in adolescence, but also its determinants: namely, why adolescents eat what they eat. The DEAS could provide the possibility of investigating some interesting aspects relationship with food, as a means of identifying adolescents with disordered eating and thus collaborating with prevention of eating problems. Promotion of life quality and prevention of diseases are recognized as responsible for saving personal and public health expenses. Variation in the spectrum of eating disturbances identified by the DEAS could aid in the development of feasible early interventions, thereby expending fewer resources than more belated treatments.

Although this study relied on a non-random participant sample – and only a small number of participants completed the retest – (which are limitations) the results point to validity of DEAS for adolescents. An additional limitation was the lack of a factor analysis of the DEAS scores; both exploratory and confirmatory analyses should be used in further investigations in order to evaluate the factor structure of the DEAS for adolescents. Another limitation is the use of self-report measures for estimating BMI of the students (and collected weight and height for ED patients); nevertheless, a meta-analysis concluded that self-reported height and weight are good estimates of actual measures<sup>43</sup>, and study in Brazil have found high consistency between self-reported and measured data<sup>44</sup>. Self-reported data are considered reliable when actual measures are not available for epidemiological studies; moreover, GLM controlled for BMI and age showed that differences between students and patients remained. Moreover, adolescents in Groups 1 and 2 were unmatched, and we do not know their socioeconomic profile; but, for the purpose of the study, age and BMI were controlled and difference in scores of DEAS remained. Nevertheless the nutritional status of this group of adolescents was similar to Brazilian adolescents living in the southeastern part of the country, where more males than females are overweight or obese<sup>45</sup>.

Prospective future studies could evaluate the eating attitudes of ED adolescent patients in the follow up to treatment, in order to understand the effect of treatment on specific eating attitudes. As the DEAS is easily administered, in the future it could be used to evaluate large community samples and in schools and health services in Brazil. Moreover, given that the DEAS is translated and validated into four languages, transnational research could be conducted, with the aim of evaluating similarities and differences in disordered eating across countries. EDs in adolescents are of increasing interest, not only for early detection and treatment, but also for prevention programs. The adolescent version of the DEAS was successful in identifying cases of risk for EDs. The DEAS should be considered as an important tool for further investigations.

## CONCLUSION

The DEAS adolescent version showed good psychometric properties and it is be thought as useful and potential in identifying disordered eating attitudes. Besides that, the scale could help to identify eating disorders risk among adolescents, therefore assisting in prevention programs.

## INDIVIDUAL CONTRIBUTIONS

**Marle S. Alvarenga** – Conceived the study, and coordinated its design, acquisition of data, analysis and interpretation.

**Priscila Koritar** – Contributed with acquisition of data with students and patients, organization of data bank and its analysis and interpretation.

**Vanessa D. Pinzon, Manoela Figueiredo and Bacy Fleitlich-Bilyk** – Participated with acquisition of data with patients, interpretation of data and helped to draft the manuscript.

**Sonia T. Philippi** – Supervised the research concerning conception, acquisition, analysis and interpretation.

**Fernanda B. Scagliusi** – Participated in the study conception and design, interpretation and critical revision. All authors read and approved the final manuscript.

## CONFLICTS OF INTEREST

On behalf of all authors, the corresponding author states that there is no conflict of interest.

## ACKNOWLEDGEMENTS

The authors would like to thank The State of Sao Paulo Research Foundation – Fapesp – (process 06/56850-9) for the

grant awarded to the first author that supported the study; the São Paulo State Technical Schools board for partnership; and Bernardo dos Santos for statistical support.

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