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Comparison between two screening questionnaires for eating disorders in adolescents

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Abstract:
***Background**: Eating disorders (ED) cause body image disturbances and health impairment. They are classified as the third most common chronic disease among adolescents. There are questionnaires that can be used for ED screening and contribute to follow-up and early diagnosis.*
***Objectives**: To evaluate the quality of two screening questionnaires for ED filled by adolescents attending in two public schools in Cascavel, Paraná, Brazil.*
***Method**: Application of EAT-26 (Eating Attitudes Test) and SCOFF (Sick, Control, One Stone, Fat, Food Questionnaire) questionnaires in a population of adolescents for ED screening. In addition, it was analyzed the following variables: sex, age, body mass index (BMI) and their correlations between EAT-26's and SCOFF's scores.*
***Results**: A total of 213 EAT-26 questionnaires were applied. Among 201 analyzed, 41(20.4%) were at risk to ED; 32 (78%) female and nine (22%) male. Age ranging from 12 years old to 18 y.o. (average: 15.5 y.o.). Regarding BMI, 16 (39.02%) were eutrophic; 18 (43.9%) overweight; six (14.63%) obese and one (2.43%) severely obese. Concerning SCOFF questionnaires, 581 were also applied. Among 521(89.6%) analyzed, 246 (47.2%) were at risk to ED; 159 (64.63%) female and 87 (35.36%) male. Age ranging from 12 to 18 y.o. (average: 15.4 y.o.). Regarding BMI, one (0.41%) was severely thin; five (2.03%) thin; 142 (57.72%) eutrophic; 66 (26.83%) overweight; 28 (11.38%) obese and four (1.63%) severely obese. There was association between sex (p=0.03), BMI (p=0.01) and trend to develop ED. Furthermore, both scales (EAT-26 and SCOFF) correlated with probability to ED (p<0.001), however there wasn't relation with age in both questionnaires.*
***Conclusion**: Both EAT-26 and SCOFF questionnaires are relevant and valuable tools for screening ED. They are able to discriminate normal adolescents and those who present trends to eating disorders.*
***Keywords**: Questionnaires. Screening. Eating Disorders. Adolescents.*

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I.INTRODUCTION

According to the World Health Organization (WHO), eating disorders (ED) are defined as a group of psychiatric disorders of genetic origin, associated with individual, family, and social psychological factors, characterized by a persistent disturbance in eating behavior[1-3]. These disorders cause significant distortions in body image, harm physical and biopsychosocial health, and present high morbidity and mortality rates[4], being classified as the third most common chronic disease among adolescents. With a global prevalence of 7.8% and a Brazilian prevalence of 13%, ED typically begin between ages 14 and 19, predominantly affecting females[1,4-6]. Among these disorders, anorexia nervosa and bulimia nervosa tend to manifest during adolescence[2,3,7,8] and often persist into adulthood[4,8].

There are questionnaires that can be used for both follow-up and diagnostic screening of ED, such as *EAT-26 (Eating Attitudes Test), SCOFF (Sick, Control, One Stone, Fat, Food Questionnaire), EDI-C (Eating*

Disorder Inventory for children), ChEDE-Q (Eating Disorder Examination Questionnaire adapted for children), KEDS (The Kids' Eating Disorders Survey) and *ChEAT (Children's Eating Attitudes Test)*[1,5,8-10].

This study aimed to evaluate the quality of two screening questionnaires for eating disorders in adolescents attending two public schools in Cascavel, Paraná, Brazil.

II.METHOD

This was a descriptive, cross-sectional, and observational study. After signing the Informed Assent Form (IAF) by the participating adolescents and the Informed Consent Form (ICF) by their parents or guardians, the *EAT-26* and *SCOFF* questionnaires were filled by adolescents aged 12 to 18 years from two public schools in Cascavel, Paraná, Brazil, for ED screening. Both questionnaires were not applied to the same adolescents – representing different samples. The *EAT-26* and *SCOFF* questionnaires were selected because they are standardized tools used in the Adolescent Medicine Outpatient Clinic at the teaching hospital where the researchers carry out their activities.

For this study, the cutoff point for the *EAT-26* was 21 points, and for the *SCOFF*, two "yes" answers. These scores were considered positive, indicating a risk of developing an ED and the need for evaluation by a mental health professional.

EAT-26 consists of 26 questions divided into three subscales (dieting, bulimia/food preoccupation, and self-control), each assessing different aspects of eating behavior. The questions are scored using a Likert scale (always=3, often=2, frequently=1, sometimes, rarely, and never=0). The total score ranges from 0 to 78 points, with higher scores indicating greater risk of developing an ED. Scores greater than 21 indicate at-risk eating behavior[8,10,11].

SCOFF is a widely used screening tool for detecting ED, consisting of five dichotomous questions (yes=1, no=0). Two or more "yes" answers suggest the possibility of an eating disorder[8,9].

Body Mass Index (BMI) was classified using the Z-score as follows: severe thinness (< Z -3), thinness (≥ Z -3 and < Z -2), eutrophy (≥ Z -2 and ≤ Z +1), overweight (> Z +1 and ≤ Z +2), obesity (> Z +2 and ≤ Z +3), and severe obesity (> Z +3). Body weight was measured using an electronic scale (Líder®, model P-300C, series 31403, year 2014, Brazil) with participants wearing light clothing. Height was measured using a wall-mounted stadiometer (*Tonelli Equipamentos Médicos Ltda*., model E150A, year 2014, Brazil) with participants barefoot. BMI was calculated using the Quetelet index (weight/height²) based on the growth charts of the WHO (2007) Child Growth Standards.

Additionally, the following variables were analyzed: sex, age, BMI, and scores on the *EAT-26* and *SCOFF* questionnaires.

Data were entered into Microsoft Excel and analyzed using Stata/SE v.14.1 (StataCorp LP®, USA, 2021). For quantitative variables, mean, median, minimum, maximum, first and third quartiles, and standard deviation were calculated. For qualitative variables, frequencies and percentages were reported. Group homogeneity in terms of age and BMI was assessed using Student's t-test for independent samples. The Chi-square test was used to assess homogeneity between groups by sex. Since groups were not homogeneous in sex and BMI, logistic regression was used to compare the probability of being classified as having an ED. A p-value < 0.05 indicated statistical significance.

This study was approved by Institutional Review Board from Western Paraná State University under opinions number 6.917.028/2024 and 5.677.767/2022.

III.RESULTS

A total of 213 *EAT-26* questionnaires were applied. Twelve (5.6%) were excluded for incomplete responses, resulting in 201 (94.3%) analyzed questionnaires. Participants' ages ranged from 12 to 18 years (mean: 15.5 years). Table 1 shows the frequencies and percentages of both questionnaires (*EAT-26* and *SCOFF*) for the variables obtained in the study. Among the *EAT-26* positives, 41 (20.4%) scored at risk for ED. Table 2 and 3 show the association between the scores in the analyzed questionnaires, sex, age and BMI.

A total of 581 *SCOFF* questionnaires were also administered. 60 (10.3%) were excluded for incomplete questionnaires, with 521 (89.7%) valid responses. Participants' ages ranged from 12 to 18 years (mean: 15.4 years). Among *SCOFF* respondents, 246 (47.2%) scored at risk for ED, being considered as positive.

Table 1 – Frequencies (n) and percentages (%) of variables on analyzed *EAT-26* and *SCOFF* questionnaires

		EAT-26*		SCOFF**	
		n	%	n	%
Gender	Female	118	58.7%	259	49.7%
	Male	83	41.3%	262	50.3%
Age	11 y.o.***	0	0%	1	0.2%
	12 y.o.	5	2.5%	4	0.8%
	13 y.o.	29	14.4%	48	9.2%
	14 y.o.	20	9.95%	83	15.9%

	15 y.o.	44	21.9%	111	21.3%
	16 y.o.	36	17.9%	148	28.4%
	17 y.o.	48	23.9%	101	19.4%
	18 y.o.	19	9.45%	25	4.8%
BMI****	Extreme thinness	0	0%	3	0.6%
	Thinness	6	3%	21	4%
	Eutrophy	123	61.2%	301	57.8%
	Overweight	51	25.4%	155	29.7%
	Obesity	16	7.9%	34	6.5%
	Serious obesity	5	2.5%	7	1.4%

**Eating Attitudes Test, **Sick, Control, One Stone, Fat, Food Questionnaire, ***Year old, ****Body Mass Index.*

Table 2 shows that there was an association between the scores on both questionnaires and sex, although the two groups were not homogeneous.

Table 2 – Relationship between the analyzed questionnaires and gender

Gender	EAT-26*		SCOFF**		p value***
	n	%	n	%	
Male	83	41.3%	262	50.3%	
Female	118	58.7%	259	49.7%	0.030
Total	201	100.0%	521	100.0%	

** Eating Attitudes Test, **Sick, Control, One Stone, Fat, Food Questionnaire ***p significance < 0.05.*

In Table 3, it can be observed that there was no association between age and the tendency to develop ED in either of the questionnaires analyzed. This differs from BMI, where a relationship was found between BMI and the probability of developing ED among the adolescents evaluated in both scales.

Table 3 – Relationship between analyzed questionnaires, age and BMI

Test	n	Mean	Minimum	1st quartile	Median	3rd quartile	Maximum	Standard-deviation	p value***
Age									
EAT-26*	201	15.5	12	14	16	17	18	1,6	0.782
SCOFF**	521	15.4	11	14	16	16	18	1,4	
BMI									
EAT-26*	201	23.1	14.5	19.6	21.9	25	67.9	6.0	0.010
SCOFF**	521	21.9	12.2	19.1	21.1	24.0	61.7	4.4	

**Eating Attitudes Test, **Sick, Control, One Stone, Fat, Food Questionnaire, ***p significance < 0.05.*

Table 4 presents the variables analyzed in positive *EAT-26* and *SCOFF* questionnaires.

Table 4 – Frequencies (n) and percentages (%) of variables on positives *EAT-26* and *SCOFF* questionnaires

		EAT-26*		SCOFF**	
		n	%	n	%
Gender	Female	32	78%	159	64.63%
	Male	9	22%	87	35.36%
Age	11 y.o.***	0	0%	0	0%
	12 y.o.	2	4.87%	1	0.41%
	13 y.o.	5	12.19%	20	8.13%
	14 y.o.	8	19.51%	36	14.63%
	15 y.o.	13	31.70%	62	25.20%
	16 y.o.	3	7.31%	72	29.27%
	17 y.o.	6	14.63%	44	17.89%
	18 y.o.	4	9.75%	11	4.47%
BMI****	Extreme thinness	0	0%	1	0.41%
	Thinness	0	0%	5	2.03%
	Eutrophy	16	39.02%	142	57.72%
	Overweight	18	43.90%	66	26.83%
	Obesity	6	14.63%	28	11.38%
	Serious obesity	1	2.43%	4	1.63%

Eating Attitudes Test, **Sick, Control, One Stone, Fat, Food Questionnaire, * year old, ****Body Mass Index.*

Table 5 presents the results obtained in the study, considering the possibility of developing ED based on the scores obtained in both questionnaires.

Table 5 – Relationship between the scores on both questionnaires and probability to develop ED

Classification	EAT-26*		SCOFF**		p value****
	n	%	n	%	
Normal	160	79.6%	275	52.8%	< 0.001
Probability of ED***	41	20.4%	246	47.2%	
Total	201	100.0%	521	100.0%	

Eating Attitudes Test, **Sick, Control, One Stone, Fat, Food Questionnaire, * Eating Disorder, ****p significance < 0.05.*

The result above indicates that both questionnaires show different probabilities of classifying an adolescent as at risk of developing an ED; however, both are useful screening tools for eating disorders during adolescence.

IV.DISCUSSION

ED in adolescents are potentially severe conditions with harmful consequences for physical, emotional, and psychosocial health[12]. According to the DSM-5[2,3], the prevalence of ED among adolescents aged 11 to 19 years is estimated at 1.2% in boys and 5.7% in girls, with an increasing incidence[2,6,13]. Early identification using screening tools such as the *EAT-26* and *SCOFF* is crucial to guide early follow-up, prevention, and intervention strategies.

Both questionnaires showed an association between ED and sex, consistent with literature indicating that these disorders are more common among girls[1,4-6,12-14]. Studies involving specific populations, such as athletes and university students, reinforce this trend, attributing higher risk to biopsychosocial and cultural factors such as aesthetic pressure, body dissatisfaction, and social media exposure[3,4,11,12,14].

When analyzed proportionally, in both questionnaires, it was observed that girls exhibited a higher tendency toward ED behaviors, a finding consistent with previous literature[12,13]. The difference in sensitivity between the instruments may be related to the nature of the symptoms assessed: the *EAT-26* emphasizes restrictive attitudes and concerns about weight and body shape, more prevalent among girls[11-16]. In contrast, the *SCOFF* showed more balanced distribution between sexes, which aligns with studies indicating a lower gender bias in this instrument; nevertheless, underreporting among boys still appears to occur, possibly due to the phrasing of the questions and distinct symptoms patterns between sexes[9,17].

Although no association was observed between age and ED probability, in this study, mid to late adolescence (ages 14 to 18) are widely recognized as critical period for the onset of ED. Studies have shown that the onset of anorexia nervosa, bulimia nervosa, and binge eating disorder generally occurs between the ages of 12 and 18[13-15]. This stage coincides with significant physical, social, and emotional changes that may increase the risk of developing dysfunctional eating attitudes. Regarding age, in the present study, middle adolescence accounted for a greater proportion of positive cases in both questionnaires, suggesting that both tools are useful for screening ED[12,13,15]. The *EAT-26* was more frequently positive among younger adolescents in the sample, whereas the *SCOFF* identified more cases among older adolescents. This difference may reflect the distinct nature of the symptoms captured by each instrument: the *EAT-26* emphasizes restrictive behaviors that may emerge earlier, while the *SCOFF* includes symptoms such as purging and binge eating, which may appear or become more pronounced during middle and late adolescence[12].

Adolescents who are overweight are at higher risk of developing disordered eating behaviors such as unsupervised restrictive dieting, binge eating, and prolonged fasting[4,12,13]. These findings are consistent with this study, which demonstrated an association between BMI and ED. Literature also suggests that excess weight correlates with low self-esteem, which may mediate the development of disordered eating[6,11]. High BMI and low self-esteem together heighten body dissatisfaction, consequently causes unhealthy eating practices. The *EAT-26* demonstrated higher specificity for overweight and obese adolescents, while the *SCOFF* showed higher sensitivity, identifying a greater proportion of eutrophic individuals. Adolescents with elevated BMI often adopt unhealthy weight control behaviors[4], including calorie restriction, fasting, and unsupervised diets[3,12,13,16,18]. In this way, a relationship was observed between BMI and the probability of developing ED in the questionnaires analyzed, which is consistent with the literature[6,12,13,15–18].

This study had some limitations: the samples were heterogeneous, preventing conclusions about which questionnaire is superior in screening accuracy – and this impaired the assessment of the sensitivity and specificity of both questionnaires; additionally, fewer participants completed the *EAT-26* compared to the *SCOFF*, which limited statistical comparison.

V.CONCLUSION

Both *EAT-26* and *SCOFF* questionnaires proved to be effective tools for screening ED among adolescents. There was an association between sex, BMI, and the likelihood of developing ED in both tools. These findings reinforce the importance of early screening, particularly in adolescent medicine outpatient clinics, since early diagnosis improves prognosis. Moreover, the combined use of both questionnaires may provide broader and more accurate screening in school and primary care settings.

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