

# Predictive factors for eating disorders in a cohort of Sicilian female students

*Maria Anna Coniglio<sup>1</sup>, Elena Commodari<sup>2</sup>, Pasqualina Laganà<sup>3</sup>*

<sup>1</sup> Department 'G.F. Ingrassia', University of Catania, Catania, Italy,

<sup>2</sup> Department of Educational Sciences, University of Catania, Catania, Italy,

<sup>3</sup> Department of Biomedical and Dental Sciences and Morphofunctional Imaging, University of Messina, Messina, Italy.

**Summary.** Identifying factors that contribute to the onset of eating disorders is fundamental to implement an early therapy. A total of 1025 female freshmen were screened to find predictive factors for eating disorders. The SCOFF Test, the EAT 26 and a questionnaire developed for the survey were used. In total, 10.5% of students showed a BMI <18.5. Percentages of 14.9% and 5.6% were found at risk for anorexia or bulimia with the EAT 26 and SCOFF test, respectively. The percentage was higher, 17.7%, with the other questionnaire. Results show that for an early identification of eating disorders it could be more useful a combination of different screening tools instead of a single one.

**Key words:** eating disorders, predictive factors, screening tools

## Introduction

Eating disorders are the most common mental problems in young women. They are complex psychiatric illnesses that impact on both physical and socio-emotional health of adolescents, and contribute to significant morbidity due to their chronicity (1). Heart damage, perforation of the stomach or rupture of the esophagus, oxidative stress, infections, failure of the endocrine and kidney systems, anemia and severe dehydration caused by the loss of the body fluids through prolonged vomiting and diarrhea, erosion and loss of teeth, as well as multiple suicide attempts due to depressive disorders following starvation are the

most frequent medical complications of eating disorders, (2-9). In eating disorders, generally adolescent girls' mental attitude towards weight and body shape are strongly disturbed. Preoccupation with weight, refusal to eat certain foods or frequent dieting, as well as purging behaviors, such as self-induced vomiting and over use of diuretics and laxatives, are common characteristics of anorexia. On the contrary, evidence of binge eating associated to purging behaviors are typical signs of bulimia nervosa or of a binge eating disorder. Finally, "otherwise specified feeding or eating disorder" (OSFED) encompasses various eating disorder behaviors which do not meet strictly diagnostic criteria for anorexia or bulimia (10).

Identifying factors that contribute to the onset, development and maintenance of eating disorders is of crucial importance in order to implement a successful and early therapeutic approach (11). To this aim, the scientific community has paid much interest in the individuation of predictive factors for eating disorders. In particular, family interaction, self-esteem, as well as perception of body image have been considered specific predictive factors for eating disorders.

Taking into consideration family factors, high levels of maternal intrusiveness have been shown to be linked to anorexia (12). On the contrary, bulimia nervosa has been associated to paternal overprotection (13). Studies on the impact of self-esteem towards eating disorders generally report a correlation between them. Although some authors do not support this relationship (14, 15) there is general consensus on the association between low self-esteem and the development of the disorders. Anyway, this dis-homogeneity is probably due to differences in methodological shortcomings on the concept of self-esteem. Finally, negative body image, as well as a disproportion between age and body mass index (BMI) have been considered the strongest eating disorders predictive factors (16, 17).

Taking into consideration the variety and heterogeneity of factors implied in the origin of eating disorders discussed above, it is important to identify as precociously as possible elements suggestive for their early detection. Several tools have been implemented in order to screen the possible presence of an eating disorder within a population. However, the majority of them take a long time to be administered and may be more useful for evaluating treatment progresses in patients with eating disorders instead of be used for screening purposes. On the contrary, brief tests are aimed at investigating only some aspects of eating disorders and consequently they may be not exhaustive.

Taking into consideration what has been argued above, the present study was aimed at identifying predictive factors of eating disorders in a cohort of Italian female undergraduates students using three different brief screening tests.

## Methods

This study included female freshmen of various disciplines at the University of Catania (Sicily, Southern Italy) in order to find predictive factors for eating disorders, independently from their university education.

Three different questionnaires were used to collect data: the SCOFF test, the Eating Attitude Test (EAT 26) and a 'new' questionnaire specifically developed by the Authors for this survey.

### *Psychometric tools used for the survey*

#### *SCOFF Test*

The SCOFF Test (18) is a screening tool intended for exploring the possibility for somebody to make experience of an eating disorder, highlighting those people who may require further investigation. It comprises 5 questions (yes / no) exploring the following fields: eating behavior and loss of control, weight concern and binge eating episodes, weight loss and dieting, body dissatisfaction and food intrusive thoughts. A cut-off points equal or more than 2 is considered predictive of abnormal eating behaviors, namely anorexia and bulimia.

#### *Eating Attitude Test 26 (EAT 26)*

The EAT 26 (19) is composed of 26 items exploring dietary regimen, bulimia, food preoccupation and oral control. It is usually used as a screening tool in non-clinical populations. Individuals who score 20 or more on the test should be interviewed by a qualified professional in order to determine whether they meet the diagnostic criteria for an eating disorder.

#### *The questionnaire developed for the survey*

The questionnaire developed for the survey included 14 closed questions and collected information on the following issues: (i) feelings about self-esteem (negative feelings, low self-esteem and its correlation

with the weight, interpersonal relationships difficulties, etc.); (ii) specific dietary and lifestyle habits, with regard to vomiting induction after eating, use of drugs to lose weight, etc.).

### *The sample*

In early 2019, the questionnaires were voluntarily filled out by the students recruited after lectures by a quota sampling method. The quota of students included in the study was selected based on availability for interviewing and on two other criteria: (i) gender (female); (ii) matriculation year (first year) in different disciplines (25% Medicine, 25% Economics, 25% Formation Science, and 25% Law). Confidentiality and secrecy were assured by not asking any question regarding identity of the responding student.

In total, 1025 female freshmen, from 18 to 22 years of age (mean age 20 years old), filled the questionnaire. The questionnaires took about 20 minutes to be completed in all the included questions. The data collected from the whole sample were analyzed.

## **Results**

Mean values and standard deviations referred to the valid number of collected questionnaires calculated for the EAT 26 test, the SCOFF test and the 'new' questionnaire are shown in Table 1.

Tables 2 and 3 show frequencies and percentages of female students that had an average score above the proposed cut-point of 20 for the Eat 26 Test (Table 2) and of 2 for the SCOFF Test (Table 3), showing to be at risk for an eating disorder. In particular, results from the Eat 26 Test showed a 14.9 % of the total of tested young women at risk for anorexia or bulimia, while the SCOFF Test revealed a 5.6% of the total of recruited students at risk for developing one of these disorders. Differences in these percentages are probably due to the different qualitative characteristics of each questionnaire. In any case, data show a high percentage of female students at risk for an eating disorder. Moreover, these data are probably related to the relatively high number of students (10.5% of the total) showing a Body Mass Index (BMI) below 18.5, suggesting to fall in the underweight range (Table 4).

**Table 1.** Mean values and standard deviation referred to the valid number of questionnaires

|  | <b>N</b> | <b>Minimum</b> | <b>Maximum</b> | <b>Mean</b> | <b>Std. Dev.</b> |
|--|----------|----------------|----------------|-------------|------------------|
| BMI                                    | 1025     | 16,84          | 29,13          | 20,9087     | 2,23303          |
| Eat 26 test                            | 1025     | 0              | 50             | 10,7054     | 10,38972         |
| SCOFF test                             | 1025     | 0              | 4              | 0,8244      | 0,9016           |
| Questionnaire developed for the survey | 1025     | 0              | 9              | 2,4927      | 2,02045          |
| Valid N                                | 1025     |                |                |             |                  |

**Table 2.** Eat 26 Test - Frequencies and percentages of female students divided on the basis of the proposed cut-point

| <b>Eat 26 test</b> | <b>Frequency</b> | <b>Percent</b> | <b>Valid Percent</b> | <b>Cumulative Percent</b> |
|--------------------|------------------|----------------|----------------------|---------------------------|
| <20                | 872              | 85,1           | 85,1                 | 85,1                      |
| 20+                | 153              | 14,9           | 14,9                 | 100                       |

**Table 3.** SCOFF Test - Frequencies and percentages of female students divided on the basis of the proposed cut-point

| <b>SCOFF Test</b> | <b>Frequency</b> | <b>Percent</b> | <b>Valid Percent</b> | <b>Cumulative Percent</b> |
|-------------------|------------------|----------------|----------------------|---------------------------|
| Score <2          | 969              | 94.4           | 94.4                 | 94.4                      |
| Score >2          | 57               | 5.6            | 5.6                  | 100.0                     |
| <b>Total</b>      | <b>1026</b>      | <b>100.0</b>   | <b>100.0</b>         |                           |

**Table 4.** Students' categories on the basis of the Body Mass Index (BMI)

| <b>BMI</b>             | <b>Frequency</b> | <b>Percent</b> | <b>Valid Percent</b> | <b>Cumulative Percent</b> |
|------------------------|------------------|----------------|----------------------|---------------------------|
| <b>Valid &gt; 18.5</b> | 917              | 89.5           | 89.5                 | 89.5                      |
| <b>&lt; 18.5</b>       | 108              | 10.5           | 10.5                 | 100.0                     |
| <b>Total</b>           | <b>1025</b>      | <b>100.0</b>   | <b>100.0</b>         |                           |

For the analyses of the results from the questionnaire specifically developed for this survey, the recruited students were divided into three different percentiles. As reported in Table 5, students showing a score  $\geq 75$  percentile were considered at risk for developing an eating disorder (score  $\geq 4$ , taking into

consideration that the lower was the score, the lower was the risk of an eating disorder).

When students were divided into two main groups on the basis of the reported score (score  $\geq 4$ , at risk, score  $< 4$ , not at risk), data showed that 17.7% of them exhibited eating habits at risk (Table 6).

**Table 5.** The questionnaire developed for this survey – Students’ categories on the basis of percentiles

|                    |                |               |
|--------------------|----------------|---------------|
|                    | <b>Valid</b>   | <b>1025</b>   |
|                    | <b>Missing</b> | <b>1</b>      |
|                    | <b>Median</b>  | <b>2,0000</b> |
| <b>Percentiles</b> | <b>25</b>      | <b>1,0000</b> |
|                    | <b>50</b>      | <b>2,0000</b> |
|                    | <b>75</b>      | <b>4,0000</b> |

**Table 6.** The questionnaire developed for this survey – Division of the recruited students in two categories: ‘not at risk’ and ‘at risk’ of developing eating disorders

| <b>BMI</b>               | <b>Frequency</b> | <b>Percent</b> | <b>Valid Percent</b> | <b>Cumulative Percent</b> |
|--------------------------|------------------|----------------|----------------------|---------------------------|
| <b>Valid Not at risk</b> | 844              | 82.3           | 82.3                 | 82,3                      |
| <b>At risk</b>           | 182              | 17.7           | 17.7                 | 100.0                     |
| <b>Total</b>             | 1026             | 100.0          | 100.0                |                           |

Table 7 shows that correlations among the three questionnaires were all high and statistically significant. Thus, the higher scores reported with the Eat26 and the SCOFF Test correspond to the higher score reported with the 'new' questionnaire.

Taking into consideration data from the 'new' questionnaire, the students were divided into two groups (cut point of 4) in order to verify whether subjects considered at risk for an eating disorder were the same considered at risk with the SCOFF and the Eat 26 tests. Table 8 compares the SCOFF Test and the Eat 26 Test.

## Discussion and Conclusion

A questionnaire is a social research tool consisting of a rigidly formalized and standardized grid, applicable to any object of investigation or social phenomenon to be analyzed.

In recent years it has become the most widespread way to collect people's thoughts and to be able to define intervention programs even in very particular sectors such as health, to investigate important issues such as vaccines, nutrition, perception of environmental risk. (20-23).

**Table 7.** Correlations among the three questionnaires

|   |                     | Questionnaire developed for the survey | SCOFF Test | Eat 26 Test |
|---|---------------------|--|------------|-------------|
| Questionnaire developed for the survey                            | Pearson Correlation | 1                                      | ,569(**)   | ,327(**)    |
|   | Sig. (2-tailed)     |  | ,000       | ,000        |
|   | N                   | 1025                                   | 1025       | 1025        |
| SCOFF Test  | Pearson Correlation | ,569(**)                               | 1          | ,276(**)    |
|   | Sig. (2-tailed)     | ,000                                   |            | ,000        |
|   | N                   | 1025                                   | 1025       | 1025        |
| Eat 26 Test   | Pearson Correlation | ,327(**)                               | ,276(**)   | 1           |
|   | Sig. (2-tailed)     | ,000                                   | ,000       |             |
|   | N                   | 1025                                   | 1025       | 1025        |
| <b>** Correlation is significant at the 0.01 level (2-tailed)</b> |                     |  |            |             |

**Table 8.** Comparison between the SCOFF Test and the Eat 26 Test

|             |      | Students considered at risk with the <i>new</i> questionnaire | N       | Mean     | Standard Deviation |
|-------------|------|---|---------|----------|--------------------|
| SCOFF Test  | ,00  | 844   | 5,1209  | ,90450   | ,03113             |
|             | 1,00 | 181   | 6,2873  | ,90388   | ,06719             |
| Eat 26 Test | ,00  | 844   | 9,3697  | 9,30189  | ,32018             |
|             | 1,00 | 181   | 16,9337 | 12,70809 | ,94458             |

In the prevention of eating disorders we must not overlook the value covered by food education, especially during the adolescence age, when people are more easily influenced in their lifestyle or habits, and the importance of making these young consumers conscious of their food choices, for example by teaching them to read and interpret labels on packaging (24,25). Eating disorders are significant causes of morbidity and mortality among young women due to their medical and psychological consequences, precisely for this reason they are among the phenomena most studied through the administration of questionnaires. Early diagnosis is linked to better outcomes. Traditional screening tools, such as EAT Test, EDI, BITE and EDE-Q, usually require long time to be administered. For this reason, several brief screening questionnaires, more suitable for use in community samples, have been developed. To date, the most promising is the SCOFF test. Nonetheless, it cannot be used as the unique method to determine whether or not people have an eating disorder because several other elements should be taken into account like, for example, an unusual BMI or body weight for the age,

restricting eating practices, changes in eating behaviors or in lifestyle (e.g., use of drugs to lose weight), as well as obsessive concerns about the body weight or shape. Thus, for a correct assessment and management of eating disorders it could be more useful a combination of different screening tools instead of a single one. The present study examined the possibility of combining three different brief tools (the SCOFF Test, the EAT 26 Test and a questionnaire specifically developed for this survey) in order to identify predictive factors for developing eating disorders in a cohort young woman.

Our results show that a high percentage of the female students considered for the survey was at risk for developing an eating disorder. Indeed, data show that the association of the three brief questionnaires is more useful than one test only in identifying the presence of an eating disorder in a population. Obviously, the identification of predictive factors ought to be integrated with deeper psychometric and medical evaluations.

**“No potential conflict of interest relevant to this article was reported by the authors”.**

## References

1. Quick VM, Byrd-Bredbenner C, Neumark-Sztainer D. Chronic illness and disordered eating: a discussion of the literature. *Adv Nutr* 2013; 4:277–286.
2. Brown NW. Medical consequences of eating disorders. *Southern Medical Journal* 1985; 78:403–405.
3. U.S. Department of Health and Human Services. Eating disorders: about more than food. National Institutes of Health NIH Publication No. TR 17–4901 Revised 2018.
4. Manna P, Jain SK. Obesity, Oxidative Stress, Adipose Tissue Dysfunction, and the Associated Health Risks: Causes and Therapeutic Strategies. *Metab Syndr Relat Disord*. 2015;13(10): 423–444.
5. Casella S, Ielati S, Piccione D, et al. Oxidative stress and band-3 protein function in *Liza aurata* and *Salmo irideus* erythrocytes: effect of different aquatic conditions. *Cell Biochem Funct*. 2012 Jul;30(5):406–10
6. Kura B, Pariikh M, Slezak J, Pierce GN. The Influence of Diet on MicroRNAs that Impact Cardiovascular Disease. *Molecules*. 2019 Apr; 24(8): 1509. Published online 2019 Apr 17.
7. Gallelli L, Cione E, Caroleo MC et al. microRNAs to monitor pain-migraine and drug treatment. *MicroRNA*. 2017, 6(3): 152–156.
8. American Psychiatric Association. Diagnostic and statistical manual of mental disorders, 5th ed. Arlington: American Psychiatric Association, 2013).
9. Stilo A, Troiano G, Melcarne L, et al. Hand washing in operating room: a procedural comparison. *Epidemiology Biostatistics and Public Health*. 2016; 13, 3, e11734-1/ e11734-7.
10. Breithaupt L, Köhler-Forsberg O, Tidselbak Larsen J. Association of Exposure to Infections in Childhood with Risk of Eating Disorders in Adolescent Girls. *JAMA Psychiatry*. 2019;76(8):800–809.
11. Cella S, Cipriano A, Iannaccone M, Cotrufo P. Identifying predictors associated with the severity of eating concerns in females with eating disorders. *Research in Psychotherapy: Psychopathology, Process and Outcome* 2017; 20:91–99.
12. Swanson H, Power K, Collin P et al. The relationship between parental bonding, social problem solving and eating pathology in an anorexic inpatient sample. *European Eating Disorders Review* 2010; 18:22–32.
13. Calam R, Waller G, Slade P, Newton T. Eating disorders and perceived relationships with parents. *International Journal of Eating Disorders* 1990; 9:479–485.
14. Young EA, Clopton JR, Bleckley MK. Perfectionism, low-self esteem, and family factors as predictors of bulimic behavior. *Eating Behaviors* 2004, 5:273–283.
15. Shea ME, Pritchard ME. Is self-esteem the primary predictor of disordered eating? *Personal and Individual Differences* 2007, 42:1527–1537.
16. Ahadzadeh AS, Rafik-Galea S, Alavi M, Amini M. relationship between body mass index, body image, and fear of negative evaluation: moderating role of self-esteem. *Health Psychol Open* 2018; 5(1):205510291877425.
17. Hosseini SA, Padhy RK. Body image distortion. Stat Pearls Publishing 2020.
18. Morgan JF, Reid F, Lacey JH. The SCOFF questionnaire. A new screening tool for eating disorders. *BMJ* 1999; 319:1467–1468.
19. Garner DM, Olmsted MP, Garfinkel PE. The eating attitude test: psychometric features and clinical correlates. *Psychological Medicine* 1982; 12:871–878.
20. Raj GD, Hashemi Z, Soria DC et al. Adherence to Diabetes Dietary Guidelines Assessed Using a Validated Questionnaire Predicts Glucose Control in Adults with Type 2 Diabetes. *Canadian Journal of Diabetes*, 2018;42: 78–87
21. Montagna MT, Mascipinto S, Pousis C, et al. Knowledge, experiences, and attitudes toward Mantoux test among medical and health professional students in Italy: a cross-sectional study. *Ann Ig* 2018; 30 (Suppl. 2): 86–98.
22. Oltra C, Sala R. Perception of risk from air pollution and reported behaviors: a cross-sectional survey study in four cities. *Journal of Risk Research*, 2018; 21(7): 869–884
23. Visalli G, Facciola A, et al. Food chemoprevention and air pollution: the health comes with eating. *Rev Environ Health*. 2020 Jun 22. doi: 10.1515/reveh-2019-0072.
24. Regan A, Raats M, Shan LC, Wall PG, McConnon A. Risk communication and social media during food safety crises: a study of stakeholders' opinions in Ireland. *Journal of Risk Research*, 2016; 19(1): 119–133.
25. Mania I, Barone C, Pellerito A, et al. Transparency and promotion of food productions. Labelling and traceability in the food supply chain as defense instruments for food products. *Ind. Alim*. 2017; 56(581):18–22.

---

Correspondence:

Pasqualina Laganà

Department of Biomedical and Dental Sciences and Morphofunctional Imaging, University of Messina, Messina, Italy

E-mail: plagana@unime.it