

1 **Prevalence of Disordered Eating Attitudes in Young Adults**

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1 **Abstract**

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3 **Objective.** The objective of this study was to assess the prevalence of disordered
4 eating and the dietary patterns of young adult female students.

5 **Method** 226 young female first and second year students were randomly recruited.
6 The EAT-26 questionnaire was used to measure disordered eating, and the State
7 Trait Anxiety Inventory tool (STAI) to assess anxiety levels.

8 **Results.** The prevalence of disordered eating (DE group) was quite high and
9 matched previous reported percentages for this age population (18%). DE students
10 showed significantly lower energy intake compared to control group (CON) ($1471 \pm$
11 357 vs. 1690 ± 563 , kcals).

12 **Conclusion.** Young adult female students show increased tendency towards
13 disordered or restricted eating behaviours. Preventive intervention concerning the
14 negative behaviours may be beneficial for all college students more so to those
15 suffering from anxiety.

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1 Introduction

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3 The primary types of eating disorders are anorexia nervosa and bulimia nervosa.
4 Although most of the disordered eating attitudes are often benign, their presence can
5 still carry significant psychological and physiological risks and is associated with an
6 increased subsequent risk of clinical eating disorders. Symptoms of eating disorders
7 are most common during adolescence, and decrease in frequency following
8 adulthood [1]. Anorexia nervosa (AN) and bulimia nervosa (BN) have been the focus
9 of intense research during the last decade. Anorexia nervosa is the third most
10 common chronic illness among adolescent females [2]. The evaluation of disordered
11 eating attitudes and behaviours in nonclinical samples is necessary to monitor and
12 track trends and changes in prevalence and to assist in the development and
13 planning of preventive and treatment programs. Anorexia nervosa is relatively
14 uncommon, but occurs worldwide. The point prevalence is no more than 0.5% of
15 women over 15 years of age [3]. The community prevalence of bulimia nervosa is
16 higher, between 0.5 and 1.0%, with an even social class distribution. The estimated
17 community prevalence of EDNOS (Eating Disorder Not Otherwise Specified), a
18 diagnostic category of sub-clinical mental disorders that involve disordered eating
19 patterns, brings the combined prevalence of eating disorder syndromes in the
20 community to around 2-3%. The majority of sufferers, up to 90%, are women [4]. The
21 evidence for changes in the incidence of anorexia nervosa over time is controversial,
22 and there is certainly no “epidemic”. There is better evidence for a true increase in
23 the incidence of bulimia nervosa in the past two decades [4].

24

25 Many of the risk factors for eating disorders are not specific to eating disorders. The
26 elucidation of the relative importance of risk factors for different eating disorder
27 syndromes and other psychological disorders, such as depression, is ongoing. The
28 pathway by which, for example, a low self-esteem may lead to the development of
29 eating disorders varies between individuals. This reflects a complex interplay
30 between biological, psychological and social factors [4].

31

32 Even though the relationship among anxiety, coping strategies, and eating disorders
33 is not clearly understood, it seems that stressors are associated with disturbed eating
34 attitudes. Furthermore, stressful life events precede the onset of anorexia nervosa
35 and bulimia nervosa in most cases [5, 6], while disordered eating is often an

1 unhealthy attempt to cope with anxiety [7]. Anxiety is almost certainly involved at
2 some point in the continuum of the pathology of eating disorders. As it is obvious
3 there are a lot of significant correlations between anxiety and eating disordered
4 behaviour.

5

6 An available assessment tool for eating disorders is the Eating Disorder Inventory, or
7 EDI, developed by David Garner and colleagues [8]. The EDI is a self-report measure
8 of symptoms. Although the intent of the EDI was originally more limited, it is being
9 used to assess the thinking patterns and behavioral characteristics of anorexia
10 nervosa and bulimia nervosa [9]. But the Eating Attitudes Test (EAT-26) is probably
11 the most widely used standardized measure of symptoms and concerns
12 characteristic of eating disorders. Many studies have been conducted using the EAT-
13 26 as a screening tool and are based on the assumption that early identification of an
14 eating disorder can lead to earlier treatment thereby reducing morbidity and
15 mortality. The EAT-26 was selected as the screening instrument used in the 1998
16 National Eating Disorders Screening Program. Level of anxiety is measured, in the
17 present study by the State-Trait Anxiety Inventory (STAI) that was initially
18 conceptualized as a research instrument for the study of anxiety in adults. It is a self-
19 report assessment device. The purpose of this study was to assess the prevalence of
20 eating disorders in young adult female university students and to compare dietary
21 intake patterns of individuals with disordered eating behaviours to normal controls.

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1 **Methods**

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3 Participants. 226 young adult females, between the ages of 18 and 24 years, recruited
4 randomly to participate in this study. All students were enrolled either in the first or
5 second year of the Nutrition and Dietetics Department of the Harokopio University
6 of Athens, Greece. Students were informed about the procedures and purpose of the
7 study and signed consents were obtained prior involvement in the study.
8 Confidentiality was assured and the study was approved by the university's research
9 ethics committee. The scientific board of the General Hospital of Greece "KAT"
10 signed the ethics approval for this study on the 19/01/2009, Protocol number: 17.

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13 Data Collection Procedures. Following the selection of the University, a letter
14 describing the study and requesting participation was given to the students. Then
15 each student willing to participate, was contacted by the researchers to confirm the
16 interest and to arrange for data collection. All measures obtained in the University.
17 Participants arrived at the metabolic kitchen of the University where they were
18 explained the purpose of the study, reminded of the study's voluntary nature, and
19 asked to respond honestly and completely to the questionnaires provided.

20

21 The Eating Attitudes Test. The EAT-26 has been used as a measure of disordered
22 eating in both Western and non-Western populations. It was devised to reflect a
23 range of symptoms that reflect eating disorders. It contains 26 items and was
24 developed to identify eating disturbances in non-clinical samples. A score of >20 on
25 the EAT-26 score represents a high likelihood of anorexia and a score of 10-20
26 represents a sub-clinical group with disordered eating habits and anorectic attitudes.
27 A score of 10 or less is considered normal [10].

28

29 The EAT-26 alone does not yield a specific diagnosis of an eating disorder. Neither
30 the EAT-26, nor any other screening instrument, has been established as highly
31 efficient as the sole means for identifying eating disorders. However, studies have
32 shown that the EAT-26 can be an efficient screening instrument as part of a two-stage
33 screening process in which those who score at or above a cut-off score of 20 are
34 interviewed in a diagnostic interview. All self-report measures require open and
35 honest responses in order to provide accurate information. The fact that most people

1 provide honest responses means that the EAT-26 usually provides very useful
2 information about the eating symptoms and concerns that are common in eating
3 disorders.

4
5 The EAT-26 consists of 26 statements. According to EAT, respondents must rate
6 whether each item applies "always," "usually," "often," "sometimes," "rarely," or
7 "never." Responses for each item are weighted from 0 to 3, with a score of 3 assigned
8 to the responses furthest in the "symptomatic" direction ("always" or "never,"
9 depending on whether the item is keyed in the positive or negative direction; item 25
10 is the only negatively keyed item on the EAT-26), a score of 2 for the immediately
11 adjacent response, a score of 1 for the next adjacent response, and a score of 0
12 assigned to the three responses furthest in the "asymptomatic" direction. Thus,
13 positively scored items are weighted as follows: always =3, usually =2, often =1,
14 sometimes =0, rarely=0, never=0. The reverse-scored item ("Enjoy trying new rich
15 foods" (item 25 on earlier versions and item 26 on the National Eating Disorder
16 Screening version) is weighted in the opposite manner (i.e., never=3, rarely=2,
17 sometimes=1, often=0, usually=0, always =0). The total EAT-26 score is the sum of all
18 items.

19
20 The State-Trait Anxiety Inventory (STAI). The self-report assessment of the State-
21 Trait Anxiety Inventory was used as a measure of anxiety. The STAI is composed of
22 two scales: 20 items measuring situational or state anxiety and 20 items for
23 underlying of trait anxiety. The State-Trait Anxiety Inventory is a validated generic
24 measure of anxiety. State anxiety may fluctuate over time and can vary in intensity.
25 State anxiety refers to situational feelings such as nervousness and worry. In
26 contrast, trait anxiety denotes relatively stable individual differences in anxiety
27 proneness and refers to general feelings of anxiety-proneness and to a general
28 tendency to respond with anxiety to perceived threats in the environment.
29 Development of the questionnaire began in the early 1960's, and the first results were
30 published in 1964 involving approximately 6,800 patients. The STAI has been
31 adapted in more than 30 languages for cross-cultural research and clinical practice
32 [11].

33
34 Dietary Assessment. All participants met with a research dietician to obtain a dietary
35 intake report. Three 24-h dietary recalls were obtained to examine the caloric and

1 other nutrient intake of the participants. Daily intake was calculated as the mean of
2 the three days. During the interviews, food models were used to estimate portion
3 sizes. Reported type and quantity of foods and beverages in the 24-h dietary recalls
4 were analyzed by research assistants and converted into an extensive nutrient list by
5 using the computer program, Nutritionist V, (First Databank, Version 1.0, USA).
6 Results included caloric content, macro- (protein, carbohydrate and fat) and micro-
7 nutrients.

8

9 Statistical analysis. SPSS software (version 10.0; SPSS, Chicago) was used for
10 statistical analysis. Simple Pearson correlations were used to investigate relations
11 between the two groups in simple anthropometry. Because of the small size of our
12 sample, we used nonparametric statistical tests, such as the Mann-Whitney *U* test
13 and the Pearson's correlation coefficient. Student's *t*-test was used to identify
14 differences between means and alpha level was set at $p \leq 0,05$. Values are shown as
15 Means \pm SD.

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1 Results & Discussion

2

3 *Participants characteristics and prevalence of eating disorders.*

4 Table 1 presents the anthropometric characteristics of the participants. There were no
5 statistically significant differences observed between DE and CON regarding BMI,
6 weight and percent body fat (%BF) between groups.

7

8 **Table 1.** Participants' characteristics of DE and CON students. No statistical
9 significant differences were observed between groups.

	DE	CON
	Mean \pm SD	Mean \pm SD
Age (yrs)	23.9 \pm 1.2	23.1 \pm 1.5
Height (cm)	164.4 \pm 5.7	164.7 \pm 5.9
Weight (kg)	61.4 \pm 9.8	59.5 \pm 8.8
BMI (kg/m ²)	22.7 \pm 3.4	22.0 \pm 2.6
%BF	30.6 \pm 8.5	29.6 \pm 7.4

10 Note: BMI = body mass index, %BF = percent body fat. Values are Means \pm SD. $p \leq$
11 0,05.

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14 The prevalence of eating disorders as established by the EAT-26 self-reported
15 questionnaire in the present study was 18%. Mean score of DE group was 25.1 \pm 4.5
16 vs 6.28 \pm 4.09 for CON ($p \leq 0.05$). DE students showed higher levels of anxiety
17 compared to CON ($p \leq 0.05$).

18

19 **Table 2.** Means and standard deviations of eating disorders score (EAT-26) and
20 anxiety levels of DE and CON groups.

21

	DE	CON
	Mean \pm SD	Mean \pm SD
EAT-26	25.1 \pm 4.5*	6.28 \pm 4.09
Anxiety	93.1 \pm 12.3*	67.0 \pm 9.3

22 Values are Means \pm SD. * different from CON group, $p < 0,05$.

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25 Macro- and micronutrient intake. Participants in DE group consumed significantly
26 less total kilocalories, kilocalories per kilogram of body weight, total protein and fat,
27 when compared to CON (Table 3). No other differences were observed between DE
28 and CON students in other dietary intake. Micronutrient intake of subject is

1 presented in Table 4. Females in the DE group consume less sodium, phosphorus
 2 and thiamine and more soluble and insoluble fiber, when compared to CON.

3

4 **Table 3.** Macronutrient and Micronutrient dietary intake characteristics of DE and
 5 CON groups.

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	<i>DE</i>	<i>CON</i>
	<i>Mean ± SD</i>	<i>Mean ± SD</i>
Macronutrients		
Kilocalories (kcal)	1471.4 ± 357.3*	1690.9 ± 563.2
Kcal/kg	24.4 ± 6.8*	29.3 ± 10.4
Protein total (gm)	58.2 ± 21.5*	66.5 ± 22.8
% Protein	15.8 ± 4.2	16.2 ± 4.0
Carbohydrate total (gm)	178.1 ± 63.3	198.1 ± 71.8
% Carbohydrate	48.1 ± 11.3	46.9 ± 7.8
Fat total (gm)	60.4 ± 19.9*	72.4 ± 30.5
% Fat	37.1 ± 9.3	38.1 ± 6.8
Saturated Fat (gm)	19.4 ± 7.1	23.4 ± 11.2
Monounsaturated Fat (gm)	23.8 ± 9.6	29.5 ± 15.0
Polyunsaturated Fat (gm)	8.8 ± 5.3	9.3 ± 5.3
Cholesterol (mg)	152.5 ± 78.4	188.5 ± 109.9
Micronutrients		
Sodium (mg)	1626.2 ± 726.7*	2102.4 ± 1608.5
Iron(mg)	17.4 ± 33.1	18.4 ± 24.9
Phosphorus (mg)	987.8 ± 395.4*	1135.5 ± 424.0
Calcium (mg)	742.2 ± 330.3	881.9 ± 374.3
Vitamin D (IU)	97.5 ± 99.7	119.4 ± 92.6
Thiamin (mg)	1.2 ± 0.6*	1.4 ± 0.8
Folate (µg)	272.1 ± 163.5	255.7 ± 134.6
Soluble fiber (g)	0.6 ± 0.6*	0.4 ± 0.4
Insoluble fiber (g)	3.8 ± 5.4*	2.4 ± 3.3

7 Values are Means ± SD. *Significant difference from CON group. p ≤ 0, 05

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11 The most important finding of this study was that 18% of young adults present
 12 eating disorders, and that participants with eating disorders may also present higher
 13 anxiety scores compared to controls. Differences also exist in the dietary patterns of
 14 DE and CON individuals. Young adult women that present eating disorders
 15 consume less total kilocalories, kcal/kg, total protein and fat, less sodium,
 16 phosphorus and thiamin and more soluble and insoluble fiber, compared to CON.
 17 However, there are no statistically significant differences between DE and CON
 18 groups in body composition indices and anthropometric measurements.

19

1 Anorexia and bulimia nervosa, along with eating disorders none otherwise specified,
2 typically have their onset during adolescence and early adulthood. The one year
3 prevalence for anorexia nervosa among young females in the general population is
4 0.5% while the corresponding percentage for bulimia nervosa is approximately 1%
5 [12]. The registered incidence rates for anorexia nervosa have increased sharply the
6 last two decades, but have been rather stable afterwards. Both bulimia and anorexia
7 are highly familial, and the heritability of the conditions may vary from 52% to 56%
8 and 54% to 83% for anorexia and bulimia respectively, as shown by studies
9 performed on monozygotic twins [13-15].

10
11 In the present study we attempted to assess the prevalence of eating disorders in
12 young adult females using a validated tool as the EAT-26 questionnaire. Dietary
13 intakes of young adults were also determined in relation to Dietary Reference Intakes
14 (DRIs) for individuals [16]. The mean intakes of the major nutrients, -carbohydrates,
15 protein, and fat- were above the recommended amount. The recommended dietary
16 intake of carbohydrates for females and males 19-30 years of age is 100gr/d. The data
17 indicated that the students consumed large amounts of carbohydrates in both
18 groups. Students in the CON group consumed 100% more carbohydrates than the
19 recommended intakes, while the corresponding percentage for DE students was 78%.
20 According to the DRIs, the acceptable range for adult carbohydrate intake in a diet is
21 45-65%. Carbohydrate intakes of both groups were within this range. Students in the
22 CON group received the $46.9 \pm 7.8\%$ of the total kilocalories ingested from
23 carbohydrates while the corresponding percentage for students for the DE group
24 was $48.1 \pm 11.3\%$. As far as protein is concerned, students in both groups consumed
25 approximately twice the recommended amount (10-35%). The recommended dietary
26 intake of protein for females aged 19-30 years is 38gr/d. Protein consumption
27 averaged at 58.2 ± 21.5 and 66.4 ± 22.8 gr for DE and CON students respectively. Fat
28 contributed approximately 37 % of total energy intake of students in both
29 departments, which is more than the recommended amount for a balanced diet.
30 According to the DRIs, the acceptable range of fat intake for adults is 20-35% (Food
31 and Nutrition Board, 2004). The current data indicate that mean micronutrient
32 intakes of sodium, phosphorus and thiamin, meet or exceeded DRIs for these
33 micronutrients. However, inadequate intakes of iron for the DE group and of calcium
34 and folate for both DE and CON groups were observed.

35

1 According to several studies, self-regard is low in individuals with eating disorders
2 [17-19]. Low self-regard derives from fear for social rejection and desire for social
3 approval. Some adolescents prefer to behave in a more “acceptable ways” so that
4 they won’t differ from others, a behaviour pattern that promotes low self-regard and
5 low self-respect [20]. Confirmed earlier findings have shown that women with
6 disordered eating generally report experiencing more stress than normal controls [21,
7 22, 7]. Toray and Cooley [23] conducted a study involving male and female
8 undergraduates, and they found that confidence in ability to control eating when
9 dealing with negative emotions was inversely related to recent weight fluctuations.
10 Accordingly, in a study of female college students, Vanderlinden et al., (2001)
11 showed that binge eating was most often provoked by negative emotion states
12 including boredom, depression and/or anxiety [24]. However such investigations are
13 correlational in nature, and therefore causation cannot be determined.
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1 **Conclusion**

2

3 In conclusion, the current study detected a rather high percentage of students (18%)
4 present eating disorders, as measured by the EAT-26 self-reported questionnaire.
5 Young adult students who claim to be more anxious appear to be at a greater risk for
6 developing disordered and restrictive eating behaviours. Preventative intervention
7 concerning the negative outcomes of both disordered and restrictive eating
8 behaviours may be beneficial for all college students, particularly those who at the
9 same time present increased anxiety levels.

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