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Disordered eating in three different age groups in Cyprus: a comparative cross-sectional study



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ABSTRACT

Objective: The objective of this study was to evaluate disordered eating behaviours (DEBs) in different age groups in a Cypriot non-clinical population sample.

Study design: Comparative cross-sectional study.

Method: A total of 1716 participants from the I.Family study completed the Eating Attitudes Test-26 (EAT-26). The EAT-26 score ≥ 20 was used to define participants at risk for DEBs. Participants were divided according to age: adolescence (12–18 years old), young adulthood (25–45 years old) and middle adulthood (46–60 years old).

Results: Mean EAT-26 total scores were higher for middle adulthood men and women compared with the two younger age groups. Young adulthood women had the highest percentage of behavioural symptoms of DEBs: binge eating (35%) and laxatives/diet pills/diuretics (12%) compared with the other age groups. Men and women in young adulthood had the highest percentage of participants with EAT-26 scores ≥ 20 . In logistic regression analysis, age group did not prove a significant predictor of DEB risk in a model adjusting for sex, body mass index and physical activity.

Conclusion: DEB can present at any age and was not confined to adolescence.

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Introduction

Extensive literature and research is available on eating disorders because of their psychological, social and health consequences.^{32,35} Epidemiological studies consistently find robust associations among eating disorders, age and gender; adolescent girls are considered the most vulnerable age group and gender for the development of anorexia nervosa (AN) and bulimia nervosa (BN).^{30,37}

In Cyprus, data on eating disorders and disordered eating behaviour (DEB) are limited. The first representative study took place in 2003 followed by a second in 2010 assessing school-aged children 10–18 years using the questionnaires the Eating Attitudes Test-26 (EAT-26) and Eating Disorder Inventory-3.¹⁵ The studies concluded that a substantial portion of adolescents (19% of boys and 35% of girls) had disordered eating attitudes and behaviours with an increasing bulimic trend.

There has been growing recognition that eating disorders can also present in middle age (40–60 years) as well.²⁹ Recent studies found disordered eating attitudes and abnormal eating behaviours among older women, with a preponderance of binge eating disorder and eating disorder not otherwise specified.^{17,27–29} This is an important age group to consider, given their role as parents. Research has linked their dieting behaviours with the development of DEBs in their adolescent children.^{1,31} Given the high percentage of adolescents in Cyprus with disordered eating attitudes and behaviours as manifested by their increased scores on the EAT-26, the evaluation of DEBs of adults is an important issue. ‘Disordered eating’ is a broader term that includes behaviours such as meal skipping, binging, laxative use, food avoidance and restriction but is not confined to the eating disorder diagnosis.⁶

The purpose of this study was to examine the DEBs of adolescents and adults within a large sample of Cypriot participants. Scores of 20 or above on the EAT-26 were used to define participants at risk for DEBs. The aim was to present EAT-26 scores by age group, gender and weight status, with a focus on the adult age groups for whom scarce data exist on the island and for which empirical evidence is needed.

Methods

The present study is part of a larger study (the I.Family study), which reassessed the children already participating in the Identification and Prevention of Dietary- and Lifestyle-induced Health Effects in Children and Infants (IDEFICS) study and their families.¹⁹

Participants

In Cyprus, the study was conducted in 2013–2014 in two areas; Strovolos and Paphos. The project was approved by the Cyprus Bioethics Committee. Informed written consent was obtained from all participants and/or legal guardians.

The present study included Cypriot participants aged 12 years and older. Inclusion criteria for the present report were complete data on gender, age, weight, height and the EAT-26.

Of the 3139 Cypriot participants aged 12 years and older, the final study sample that entered the analyses consisted of 1716 (55%), 994 women and 722 men of whom 507 were between the age of 12 and 18 years (268 girls and 239 boys).

Participants were divided into three groups according to their age: adolescence (12–18 years old), young adulthood (25–45 years old) and middle adulthood (46–60 years old).²⁵

Measurement of eating attitudes and behaviours

The EAT-26 was used to evaluate the participants' attitudes towards food, dieting, eating, physical appearance and personal control over eating.^{14,13} The EAT-26 is a self-report questionnaire of 26 items rated on a 6-point Likert scale with total scores ranging from 0 to 78. The clinical cut-off for eating disturbances is a score of 20 or above.¹⁴ Previous validations of the EAT-26 reported good reliability coefficients across studies ranging from 0.79 to 0.94.³⁶ In the present study, Cronbach's alpha coefficient was found to be 0.81, showing good internal consistency. The EAT-26 items form three subscales: dieting (range: 0–39), bulimia and food preoccupation (range: 0–18) and oral control (range: 0–21). The questionnaire includes four behavioural questions aimed at determining the presence and frequency of extreme weight control behaviours on a scale ranging from ‘never’ to ‘daily’.¹⁴ The behavioural questions of the EAT-26 were divided into two categories ‘never’ and ‘occurred’. Three criteria determine eating disorder risk: the EAT-26 total score at or above 20, body mass index (BMI) meets the criterion for ‘underweight’ and a positive response to any of the behavioural questions indicating possible eating disorder symptoms.¹²

Anthropometric measurements

The weight of participants was measured in light clothing using an electronic scale (Tanita BC 418 MA), and height was measured without shoes using a stadiometer (Seca 225). BMI for age was calculated (as kg body weight/m²) and categorised using the proposed procedures and cut-offs by the International Obesity Task Force.⁸ Anthropometric examinations were carried out by trained fieldworkers.

Statistical methods

All statistical calculations were performed using SPSS software, version 20.0 (IBM, New York, NY, USA). The Kolmogorov–Smirnov test revealed that continuous variables (EAT-26 total scores and subscales) were not normally distributed; therefore, non-parametric tests were used. The Mann–Whitney U-test was used to assess statistical evidence for differences between women and men of the same age group. The Kruskal–Wallis test was selected to determine differences between the three age groups on the EAT-26 and subscales. The Kruskal–Wallis test assesses differences between several independent groups in non-normally distributed data and produces test statistic H. Chi-squared test was used to determine which age group had the highest percentage of participants with EAT-26 total scores ≥ 20 .

Logistic regression analysis was carried out to evaluate the association of DEB risk (EAT score ≥ 20) with age group. Both

an unadjusted model and a model adjusted for gender, BMI and physical activity were built. For all analyses, a *P*-value of 0.05 was considered as the level of statistical significance.

Results

Characteristics and measurements of the study population

Characteristics and measurements of the study population according to the three age groups and gender are presented in Table 1. The Mann–Whitney *U*-tests showed men in each age group to have higher BMI compared with women. Women of all the three age groups had higher EAT-26 total scores than men. Women in young adulthood had the highest frequency of EAT-26 scores above the 90th percentile compared with all other age groups.

Differences in mean EAT-26 scores and frequencies of behavioural symptoms of DEBs by sex and age

Significant differences were found between age groups in both men and women on measures of eating attitudes and behaviours (Table 2).

In men, adolescent boys had the lowest scores on the EAT-26 ($H = 12.7, P < .01$) and subscale of dieting ($H = 15.1, P < .001$) compared with the older age groups, whereas middle adulthood men had the highest scores. Middle adulthood men also had the highest score on the oral control subscale compared with the other male age groups. No age differences were found for men on the bulimia and food preoccupation subscale ($H = 2.6, P > .05$).

In women, EAT-26 total scores ($H = 14.7, P < .001$) and subscale scores of dieting ($H = 20.9, P < .001$) and bulimia and food preoccupation ($H = 5.9, P < .05$) were lower in adolescent girls compared with the two older age groups. On the oral control subscale, women in middle adulthood had the highest scores and young adulthood women had the lowest.

Table 2 also presents the results of the behavioural questions of the EAT-26 questionnaire (behavioural symptoms). Presented as *N* (%) are those participants who gave a positive

answer for a particular behaviour. Exercise was the most frequent weight control behaviour ranging from 26.6% to 49.1% across groups. The percentage of men and women who exercised as a weight control measure decreased with each successive age group, in both genders. Binge eating was found to be the second most frequent weight control behaviour, with the exception of women in young adulthood who reported binge eating (35.4%) more frequently than exercise (30.6%) as a weight control measure. Additionally, 12% of women in this age group reported using laxatives, diet pills or diuretics as weight control measures. This method of weight control was used almost three times more frequently in young adulthood women compared with middle adulthood ($H = 38.96, P < .001$). No adolescent girls reported using laxatives or diet pills to control their weight.

Differences in mean EAT-26 scores and frequencies of behavioural symptoms of DEBs by BMI category and sex

Focussing on BMI, significant differences were found on all scales for both genders (Table 3). Overweight and obese individuals had higher EAT-26 total scores, dieting, bulimia and food preoccupation scores compared with underweight and normal weight individuals. Underweight participants applied more self-control over eating compared with the other BMI groups.

Twelve percent of men ($\chi^2 = 28.5, P < .001$) and 23% of women ($\chi^2 = 345.8, P < .001$) in young adulthood had the highest percentage of EAT-26 scores at or above 20 compared with the other two age groups. When two criteria were used as indicators of disordered eating, EAT-26 total score ≥ 20 and underweight or normal weight status,¹² adolescent boys (3.6%) and women in middle adulthood (15.4%) had the highest percentage compared with same gender age groups (Fig. 1).

Unadjusted and adjusted logistic regression analysis: association between age group and DEBs

Logistic regression analysis to evaluate the association of DEB risk (EAT-26 total scores ≥ 20) with age group was used (Table 4). The outcome measure was the EAT-26 score ≥ 20 ,

Table 1 – Characteristics and measurements of the study sample in relation to age group and gender.

Characteristics	Men			Women		
	Adolescence (12–18 y)	Young adulthood (25–45 y)	Middle adulthood (46–60 y)	Adolescence (12–18 y)	Young adulthood (25–45 y)	Middle adulthood (46–60 y)
	N = 239	N = 300	N = 183	N = 268	N = 596	N = 130
Age in years, mean (SD)	14.3 (1.5)	40.5 (3.4) ^b	50.1 (3.6) ^a	14.4 (1.5)	39.0 (4.0)	49.1 (3.2)
BMI (kg/m ²), mean (SD)	22.6 (5.1) ^a	28.9 (4.6) ^b	29.1 (4.6) ^b	21.3 (4.1)	25.4 (5.2)	27.6 (7.2)
Overweight, N (%)	63 (26.4)	135 (45.2)	78 (42.9)	46 (17.2)	160 (26.9)	44 (33.8)
Obese, N (%)	38 (15.9)	106 (35.5)	68 (37.4)	20 (7.5)	107 (18.0)	34 (26.2)
EAT-26 (total score), mean (SD)	8.2 (7.6)	9.4 (7.9)	10.3 (7.8)	11.1 (9.2) ^b	13.0 (9.2) ^b	13.4 (8.9) ^b
EAT-26 ≥ 20 , N (%)	19 (7.9)	37 (12.3)	19 (10.4)	43 (16)	138 (23.2)	28 (21.5)
EAT-26 >24, 90th percentile, N (%)	10 (4.3)	17 (5.8)	12 (6.6)	23 (8.9)	78 (13.3)	13 (10.3)

BMI, body mass index; EAT-26, eating attitudes test-26; SD, standard deviation.

Significant differences between men and women of the same age group (Mann–Whitney *U*-test): ^a*P* < .01, ^b*P* < .001.

Table 2 – Age differences in men and women on the EAT-26, subscales and behavioural symptoms.

Variable	Men				Women			
	Adolescence (12–18 y)	Young adulthood (25–45 y)	Middle adulthood (46–60 y)	H	Adolescence (12–18 y)	Young adulthood (25–45 y)	Middle adulthood (46–60 y)	H
	N = 239	N = 300	N = 183		N = 268	N = 596	N = 130	
^a EAT-26 (total score)	8.2 (7.6)	9.4 (7.9)	10.3 (7.8)	12.7 ^c	11.1 (9.2)	13.0 (9.2)	13.4 (8.9)	14.7 ^b
^a Dieting	4.9 (5.1)	6.2 (5.6)	6.4 (5.4)	15.1 ^b	7.2 (6.5)	9.2 (7.0)	9.1 (6.5)	20.9 ^b
^a Bulimia and food preoccupation	1.0 (1.8)	1.1 (1.8)	1.0 (2.0)	2.6	1.3 (2.0)	1.6 (2.4)	1.5 (2.1)	5.9 ^d
^a Oral control	2.3 (2.6)	2.1 (2.4)	3.0 (2.7)	17.2 ^b	2.7 (3.0)	2.3 (2.5)	2.9 (2.9)	10.0 ^c
A. Gone on eating binges where you feel that you may not be able to stop	58 (24.6)	76 (25.5)	36 (20)	2.48	89 (33.3)	209 (35.4)	32 (25.0)	5.0
B. Made yourself sick (vomited) to control your weight or shape	5 (2.1)	3 (1.0)	0	5.31	3 (1.1)	16 (2.7)	0	5.36
C. Used laxatives, diet pills or diuretics to control weight or shape	2 (0.9)	11 (3.7)	5 (2.8)	3.29	0	71 (12)	6 (4.7)	38.96 ^b
D. Exercised more than 60 min/day to lose or to control your weight	109 (46.6)	101 (33.9)	53 (29.4)	14.62 ^b	130 (49.1)	181 (30.6)	34 (26.6)	29.38 ^b

EAT-26, eating attitudes test-26; SD, standard deviation.
Significant differences among age groups of the same gender (Kruskal–Wallis test): ^bP < .001, ^cP < .01, ^dP < .05.
^a Values are presented as mean (SD).
A–D: values are presented as N (%).

Table 3 – Differences between BMI groups of each gender on the EAT-26 and subscales.

Variable	Men					Women				
	Underweight	Normal weight	Overweight	Obese	H	Underweight	Normal weight	Overweight	Obese	H
	N = 13	N = 219	N = 276	N = 212		N = 28	N = 553	N = 250	N = 161	
EAT-26 (total score)	10.1 (8.1)	6.4 (4.8)	9.5 (9.9)	12.8 (7.7)	43.8 ^a	8.3 (8.6)	10.4 (9.0)	13.3 (8.7)	16.0 (11.8)	95.4 ^a
Dieting	2.8 (3.0)	3.2 (3.0)	6.5 (6.8)	8.8 (5.6)	92.7 ^a	3.5 (4.9)	6.6 (6.0)	9.9 (7.0)	10.6 (8.3)	138.8 ^a
Bulimia and food preoccupation	1.4 (1.9)	0.7 (1.4)	1.1 (1.9)	2.0 (2.5)	39.3 ^a	0.9 (2.5)	1.1 (1.8)	1.3 (2.1)	2.5 (2.5)	81.6 ^a
Oral control	5.9 (4.1)	2.5 (2.7)	2.0 (2.5)	2.0 (1.9)	13.3 ^a	4.0 (2.4)	2.7 (3.2)	2.1 (2.2)	2.9 (3.2)	21.5 ^a

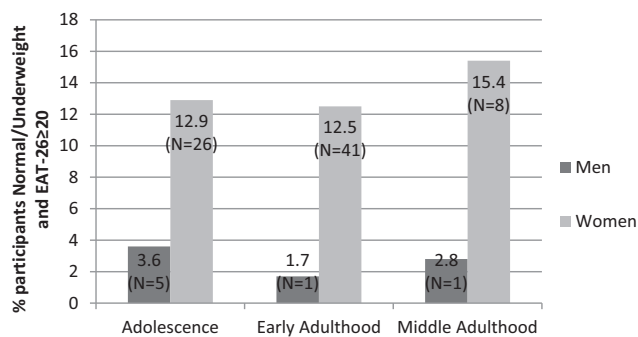
BMI, body mass index; EAT-26, eating attitudes test-26; SD, standard deviation.
Values are presented as mean (SD).
^aP < .001 (Kruskal–Wallis test).

Table 4 – Logistic regression analysis to evaluate the association between age group and risk of DEBs (EAT-26 score >20).

Age group (years)	Odds ratio	95% confidence interval	P value
Unadjusted model			
12–18	Ref		
25–45	1.80	1.31 to 2.50	<0.001
>45	1.32	0.86 to 1.99	NS
Adjusted model 1 ^a			
12–18	Ref		
25–45	0.94	0.66 to 1.34	NS
>45	0.71	0.45 to 1.13	NS
Adjusted model 2 ^b			
12–18	Ref		
25–45	1.06	0.74 to 1.52	NS
>45	0.82	0.51 to 1.32	NS

NS, not significant; BMI, body mass index.

The number of included participants in the models was 1653.

^a Adjusted for sex and BMI.^b Adjusted for sex, BMI and physical activity.**Weight Category and EAT-26 score****Fig. 1 – Percentage of participants who are under or normal weight with EAT-26 scores at or above 20. EAT-26, eating attitudes test-26.**

and age group was the main exposure variable. In the unadjusted model, ages 25–45 years had increased odds for DEBs compared with adolescence (ages 12–18 years). But when an adjusted model—with BMI, gender and physical activity—was used, then no association was identified between DEB risk and age group. A likelihood ratio test indicated that the adjusted model was superior to the unadjusted model ($P < .001$).

Discussion

The results of the present study focussed on DEBs in different age groups in Cyprus. Overall, young and middle adulthood participants had higher mean scores on the EAT-26. Disordered eating attitudes (EAT-26 score ≥ 20) were more frequent in young adulthood men and women compared with adolescence and middle adulthood. Young adulthood women presented DEBs (binge eating, vomiting, laxatives/diet pills/diuretics) more frequently than any other group. However, logistic regression analysis identified no significant association between DEB risk and age group. These results suggest we move beyond the notion of adolescent girls as the vulnerable age group and gender for DEBs.

The EAT-26 has been used as a screening tool for eating disorder risk (e.g. AN, BN), but scores alone do not yield a diagnosis of an eating disorder.¹⁴ Rather, high scores show 'disordered eating', a broader term that includes behaviours such as meal skipping, binging, laxative use, food avoidance and restriction but is not confined to the eating disorder diagnosis.⁶ Using the proposed approach/methodology, the present study found that almost one in four women examined in Cyprus aged between 25 and 60 years presented disordered eating attitudes and one in ten aged between 25 and 45 years used laxatives or diet pills to control their weight. One other study on a non-clinical university population in Cyprus using dichotomous EAT-26 score ≥ 20 as evidence of disordered eating found similar percentages (21.4% of 18- to 34-year-olds had high scores).³ In Greece, 23% of 18- to 30-year-olds were found to have scores above 20 on the EAT-26.⁹ Although in the latter study a narrower age range was used for defining young adulthood women, similar percentages were found. Midlarsky and Nitzburg²⁹ in the United States investigated women in middle adulthood (45–60 years old) and found a percentage of 14.8, considerably smaller than the 21.5% found in the present study. A possible explanation for the higher percentages found is that disordered eating is strongly related to weight gain^{11,16} and the prevalence of overweight and obesity in Cyprus (as in Greece) is very high compared with other European and Western countries.²

Comparing the results of the EAT-26 subscales in the present study with other similar research, certain patterns begin to emerge. Kavazidou et al.²⁴ found eating behaviour to be affected by age such that adolescents exercised more self-control over eating (oral control subscale) compared with 18–45-year-olds, a finding replicated in this study. This is consistent with research supporting self-control and eating restrictions being more often observed among adolescents than young adults.⁵ Research has also shown adult women to be more likely to binge eat and be preoccupied with food compared with younger women; although with regard to

many indices of disordered eating and body image, older women with eating disorder resemble younger women with similar conditions.^{5,24,27,28,33} The present findings on Cypriot women tend to concur with these results; bulimia and food preoccupation scores were indeed statistically higher among 25–60-year-old women compared with adolescent girls, but no differences in oral control between adolescent girls and women older than the age of 45 years were found (although actual mean score differences were very small). Other research has found significantly higher scores on scales of restrained eating in postmenopausal compared with premenopausal women.¹⁰ Although menopausal status was not assessed in our study, it might account for differences in oral control between women in young and middle adulthood.

In the literature, mean EAT scores and the percentage of men at risk for eating disturbances varies widely; among school-age boys, figures range from 1% to 7% and among 18- to 34-year-old men, from 0% to 6%.²¹ Few studies include men older than 35 years. Findings from this study showed slightly higher percentages for Cypriot men (8–12%). Men in middle adulthood exercised more self-control over eating (oral control subscale), and only a very small percentage of men had high EAT-26 scores and were underweight or normal weight. Masculinity as opposed to weight loss is thought to be an important motivation underlying disordered eating in men.^{22,26} Symptomatology screening such as the EAT-26 may not capture the range of male eating behaviours because they may not be preoccupied with dieting or oral control but rather weightlifting, excessive exercise and food supplements.²⁴

Age, when BMI, gender and physical activity were taken into account, was not found to be a statistically significant predictor of DEB risk but can be explained by BMI. Research has confirmed that overweight and obese individuals do follow diets more often than normal weight individuals.^{24,36} That age group was not a significant predictor of DEB risk is important to consider. Research on eating disorders has focussed on adolescent females, who are considered the vulnerable age group and gender for the development of AN and BN.^{37,30} This was not found to be the case, which begs the question are we neglecting DEBs in older-aged women? BMI can only partially explain or predict eating attitudes and behaviours. It has been emphasised that it is not BMI per se that is of critical importance in shaping disordered eating patterns and behaviours but the person's perception of themselves as overweight/obese and their level of body dissatisfaction.³⁴

Disordered eating in non-Western countries has been associated with modernisation, urbanisation and media exposure promoting the Western beauty ideal.^{4,23,37} Cyprus, a non-Western society, with strong interrelations among members could make these media effects and the internalisation of the 'thin ideal' easier to infiltrate into societal norms.^{3,23} With increasing affluence, higher incidences of disordered eating are observed;¹⁸ economic developments in Cyprus after 1974 have resulted in emphasis on wealth. Such factors could contribute to higher prevalence rates of disordered eating attitudes and behaviours among Cypriots.

Limitations of the present study included use of a single self-report questionnaire to assess disordered eating attitudes and behaviours. In future studies, it would be useful to use more objective criteria, such as a combination of

questionnaires or a two-stage procedure for assessment such that screening with use of a questionnaire such as the EAT-26 is followed by more specific diagnostic tests or clinical interviews.^{14,20} The research was cross sectional, and inferences regarding age effects could not be made; only longitudinal studies can provide insight into changes in eating attitudes and behaviours with increasing age. The sample was confined to two areas which limit the generalisability of findings to the Cypriot population. Further investigation on possible links between adolescent's DEBs and the eating attitudes and behaviours of their parents is greatly needed but is beyond the scope of the present study. Future research is definitely warranted focussing on older groups, assessment of underlying factors, risks and mechanisms influencing disordered eating in adulthood.

Research on eating attitudes and behaviours in non-clinical, normal Cypriot individuals has only recently started. Findings confirm that disordered eating attitudes can be found across all age groups, in both genders. Young adult women (25–45 years of age) in Cyprus had the highest frequency of DEBs including binge eating, laxative/diet pill/diuretic use and vomiting. Promotion of healthy eating behaviours, weight satisfaction and age-appropriate interventions are called for.

Author statements

Ethical approval

The project was approved by the Cyprus Bioethics Committee.

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Competing interests

None declared.

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