

Eating disorders and associated risk factors among Imam Abdulrahman bin Faisal university preparatory year female students in Kingdom of Saudi Arabia

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ABSTRACT

الأهداف: تقدير مدى انتشار الإضطرابات الغذائية بين طالبات السنة التحضيرية في جامعة الإمام عبدالرحمن بن فيصل بالمنطقة الشرقية من المملكة العربية السعودية، بالإضافة لبحث أنماط الضغوطات الداخلية والخارجية التي يتعرضن لها من أجل الحفاظ على مظهر جسدي مثالي.

الطريقة: تم استخدام نمط الدراسة مقطعية (أو عرضية) كوسيلة لبحث مدى انتشار الإضطرابات الغذائية والعوامل المرتبطة. وتمت الإستعانة بإستبيان للتعبئة الذاتية مع الملاحظة لجمع البيانات التي تشمل العادات الغذائية (اختبار 26) لقياس أعراض وخصائص الإضطرابات الغذائية بمجرد الحصول على 20 نقطة أو أكثر، كذلك تم استخدام استبيان النظرة الثقافية والإجتماعية للمظهر الخارجي (SATAQ-4) لقياس الضغوطات الداخلية والخارجية المحتملة والتي قد تؤدي إلى إضطرابات غذائية. وأخيرا تم طرح بعض الأسئلة عن العادات الغذائية لتحديد ما إذا كانت الموجبات بحاجة إلى استشارة مختص بالإضطرابات الغذائية.

النتائج: أظهرت نتائج اختبار (غذاء - 26) أن نسبة 29.4% من الطالبات تم تصنيفهن تحت بند المعرضات بنسبة عالية للإضطرابات الغذائية. فيما 45.5% صُنِّفوا من ضمن المعرضات للعادات الغذائية غير الصحية. وأخيرا ما نسبته 60.7% ممن حققن درجة أعلى من 20 في اختبار (غذاء - 26) أظهرن احتمالية تعرض عالية للعادات الغذائية غير الصحية وحوالي 11.5% من المشاركات حققن نسبة في اختبار المحتوى الجسدي (مؤشر كتلة جسم) والتي تضعهم ضمن فئة الوزن المنخفض أو الوزن حاد الإنخفاض وبالتالي هن بحاجة إلى استشارة نفسية. وقد أظهرت نتائج الدراسة علاقة كبيرة بين ضغط الأسرة لخسارة الوزن الذي تتعرض له المشاركات في اختبار (غذاء - 26) ممن حققن درجة 20، كما أظهرت النتائج تأثير الإعلام كأحد عوامل الضغوط الخارجية على خسارة الوزن.

الخاتمة: الإكتشاف المبكر للإضطرابات الغذائية أو العادات الغذائية غير الصحية ضروري للتقليل من مخاطرها على الصحة النفسية والجسدية للمصاب.

Objectives: To estimate the prevalence of eating disorders among Imam Abdulrahman bin Faisal University (IAU) in Dammam, Kingdom of Saudi Arabia, female students and to investigate the associated factors.

Methods: A cross-sectional study was conducted at IAU, Dammam, Kingdom of Saudi Arabia, in 2016 with 670 participants. Data was collected by self-administered questionnaires, including the Eating attitude test 26 (EAT-26) and the sociocultural attitudes toward appearance questionnaire (SATAQ-4). Eating behavior questions were asked to determine whether the respondents should seek evaluation for an eating disorder (ED) from a professional.

Results: Eating attitude test 26 results showed that 29.4% of participants were categorized at a high level of concern for an ED, and 45.5% were categorized as at risk of having problematic feeding behaviors. Of the participants who scored above 20 on the EAT-26, 60.7% demonstrated high-risk feeding behavior attitudes, and approximately 11.5% who scored a body mass index (BMI) classified as underweight or very underweight required referral to a psychologist. A significant relationship was found between family stress to lose weight and EAT-26 scores above 20. The media was also found to represent external influence to lose weight.

Conclusion: This study concluded that early detection of EDs or problematic feeding behaviors and attitude is vital to minimize the risks to physical health and well-being of the sufferers' experiences.

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Eating disorders (EDs) feature disturbances which impair health and psychosocial functioning.¹ With health risks ranging from low blood pressure, slow heart rate and severe dehydration in anorexia.¹ And electrolyte and type 2 diabetes mellitus in bulimia to death.¹

Both males and females experience EDs during adolescence and young adulthood.¹ However, rates are higher in young and adult females^{2,3} Which can begin as young as 6 and continue into adulthood.³

The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) categorizes EDs into mutually exclusive categories based on observed symptoms (**Appendix 1**), with young adult females particularly at high risk.²

Western countries report rates of 0.3% for anorexia nervosa and 1% for bulimia among young females.⁴ Studies in Kingdom of Saudi Arabia,⁵ Arab countries,^{6,7,8} and in an international context,^{9,10} report rates for young adult females of 24%,^{11,12,13} in which the usual presentation is with a mental health problem including anxiety, depression, or a behavioral disorder.¹¹ Eastern countries report that subclinical types of EDs are more prevalent.^{14,15}

Studies of EDs and the associated risk factors largely focus on sociocultural factors, perceived body image, the media, and perceived pressure from family and peers, individual comparisons of one's body with others, perceived pressure from peers and family members, media representations and sociocultural influences.^{16,17,18,19}

Early recognition of mild forms of ED can help prevent inappropriate eating behaviors and attitudes leading to more severe forms of ED.^{2,20} Eating disorder prevalence rates and associated risk factors among women (and men) in Kingdom of Saudi Arabia have been particularly understudied. With a focus on young adolescent girls.

As Saudi women comprise 60% of all college students in the Kingdom of Saudi Arabia.²¹ This study aims to estimate the prevalence of EDs among orientation-year female students in Imam Abdulrahman bin Faisal University, Dammam, Kingdom of Saudi Arabia, and to determine the association between EDs and internal and external pressure affecting these females.

Methods. This study was performed with a cross-sectional study design conducted at Imam Abdulrahman

bin Faisal University, Dammam, Kingdom of Saudi Arabia, academic year 2015-2016. This is the largest government university in the Eastern Region of the Kingdom of Saudi Arabia; students join a preparatory year of 8 tracks (health, design, literature, etc.) and then, according to their grades, join different colleges the following year.

A stratified, random sampling technique was used to recruit preparatory-year female students from 4 specialty colleges at Imam Abdulrahman bin Faisal University in Dammam, Kingdom of Saudi Arabia, namely, medicine, interior design, science and community college, using proportional allocation. Excluding non-Saudi and pregnant females. A sample size of 670 participants were included in this study, which exceeded the minimum required sample size 480, calculated using Epi Info 3.4, assuming 50% prevalence of EDs, at a 95% confidence level and precision of 5 and further expecting an 80% response rate.

Data collection was carried out using both a pre-scheduled questionnaire (**Appendixes 1**) and anthropometric measurements. All data were collected by the primary investigators with the assistance of 3 trained nurses.

The questionnaire comprised 3 main sections. The first section collected participants' socio-demographic data. Part of this section was adopted from the original EAT-26 questionnaire developed by Garner and Garfinkel in 1979, and additional variables were included in the questionnaire by the researchers after thorough literature review and given the association identified in many studies between higher socioeconomic status and more extreme eating attitudes and behaviors.²²

The second section measured abnormal eating and weight concerns, using the 26 items of the EAT-26 questionnaire. Each item was answered on a 6-point Likert scale, giving a possible range of 0-78. An additional 5 eating behavior questions were included in the questionnaire (**Appendix 2**).

The third section of the data collection instrument comprised the socio-cultural attitudes toward appearance questionnaire (SATAQ-4), a 22-item questionnaire, each question measured on a 5-point Likert scale. This supported the collection of data related to the potential external pressure on the individual that might lead to an increase or decrease in the prevalence of EDs. The SATAQ-4 focused on 4 sociocultural domains: self-pressure to be thin or muscular; family pressure (including parents, brothers, sisters, relatives) toward appearance; peer pressure (including close friends, classmates, and other social contacts) toward appearance; and media pressures (including television,

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magazines, the internet, movies, billboards, and advertisements) toward appearance (Appendix 3). The questionnaire achieved a Cronbach alpha score >0.8 for the 3 sections.

The questionnaire was originally developed in English and then double translated from English into Arabic then to English by 2 certified translators.

Table 1 - Distribution of study participants according to sociodemographic characteristics.

Characteristic (N=656)	n (%)
Marital status	
Single	595 (90.7)
Married	57 (8.7)
Divorced	3 (0.5)
Widowed	1 (0.2)
Order in family	
Oldest	141 (21.6)
Middle	410 (62.7)
Youngest	101 (16.4)
Only child	2 (0.3)
Living with	
Parents	63 (93.4)
Husband	34 (5.2)
Alone	4 (0.06)
Other	5 (0.08)
Standard achievement admission test	
90–100%	112 (17.1)
89–70%	503 (76.7)
<70%	41 (6.2)
General abilities (skills)	
90–100%	173 (26.4)
89–70%	464 (70.8)
<70%	18 (2.7)
High school GPA	
90%–100%	633 (96.5)
70%–89%	23 (3.5)
<70%	0 (0.0)
Family monthly income (SR)	
<5000	28 (4.3)
5000–10000	123 (19.0)
10001–15000	177 (27.4)
>15000	319 (49.3)
Father Education	
Illiterate	7 (1.1)
Primary	25 (3.8)
Middle	67 (10.2)
Secondary	163 (24.8)
University	350 (53.4)
Postgrad	33 (5.0)
Institute	11 (1.7)
Mother Education	
Illiterate	19 (2.9)
Primary	66 (10.1)
Middle	84 (12.8)
Secondary	175 (26.7)
University	277 (42.2)
Postgrad	6 (0.9)
Institute	29 (4.4)

Classes were selected by simple random sampling. All students in the selected classes were invited to participate; Students whom did not want to participate in the study were given permission to leave the classroom. Yet, the response rate was 98%. Participants were given 15 minutes at the end of the class lectures to complete the questionnaire. Two anthropometric measures were taken by a trained nurse in a one-to-one setting to ensure participants' privacy: height (m), using a digital telescopic wall-mounted stadiometer; weight (kg), using an electronic scale.

Fourteen incomplete questionnaires were excluded from the data analysis, resulting in 656 eligible for analysis (colleges of medicine [n=151], interior design [n=61], science [n=319], and community college [n=125]); the data was entered in SPSS version 20.0 software (IBM Corp., Armonk, NY, USA).

The EAT-26 items formed 3 subscales: dieting, Bulimia/food preoccupation, and oral control. The subscale scores were computed by summing all items assigned to that scale as follows: dieting (13 items); Bulimia and food preoccupation (5 items); oral control (7 items).

Items 1-25 were scored as follows: Always=3, Usually=2, Often=1; sometimes, rarely and never=0; item 26 was scored in the reverse direction. A score of 20 or more on questions 1-26 was deemed to indicate that the participant was at high risk for developing an ED. If a participant checked any of the 5 additional behavior questions or scored 20 or more in EAT-26, she was considered liable for referral to a trained mental health professional for an evaluation.

The SATAQ-4 items formed 5 subscales: Internalization thin/low body fat items 3-5, 8 and 9; Internalization muscular/athletic items 1, 2, 6, 7, and 10; pressure of family items 11-14; pressure of peers items 15-18; pressure of media items 19-22. Each of the test items was scored on a 5-point variable scale: definitely disagree=1; mostly disagree=2; neither agree nor disagree=3; mostly agree=4; and definitely agree=5. An average score percent was computed for each of the 5 subscales.

Any behavioral eating questions that yielded a positive answer indicated that the respondent should seek evaluation from a professional.

Body mass index was calculated as body weight (kg) divided by height (m²) and then categorized as underweight (BMI<18.5), normal (18.5≤25), overweight (25≤30), and obese (BMI of 30 or more).

Descriptive statistics were presented as frequency and percent and summary statistics (median and range). The chi-square test was used to test the association of

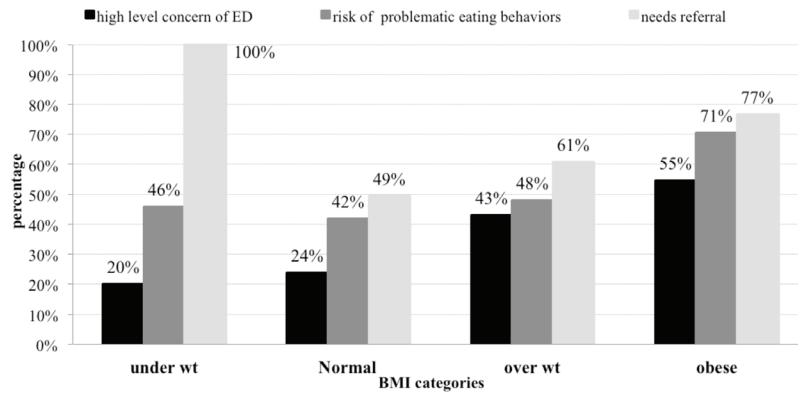


Figure 1 - Distribution of high level of concern of Ed, risk of problematic ED, and need for referral among different BMI categories. BMI - body mass index, ED- Eating disorders

categorical variables with EDs, referral, and BMI categories.

The SATAQ-4, 5 subscales score percent were tested using Shapiro-Wilk test and were found to be not following normal distribution. Relationships between SATAQ-4 items and the presence of eating disorders, referral and BMI categories were tested using Mann-Whitney U and Kruskal-Wallis tests. A p -value<0.05 was considered significant.

The local Ethical Committee approved this study, and permission was also sought and obtained from the IAU, Dammam, Kingdom of Saudi Arabia.

Results. The study comprised 656 female students aged 18-23 years old, with a mean of 18.7 ± 0.74 years; other demographic data are presented in Table 1. As shown in Table 2, 29.4% were categorized at a high level of concern for an ED based on EAT-26 scores. Notably, 45.5% of participants were categorized to be at risk of having problematic eating behaviors. More than half the participants 61.5% had a BMI within normal range, 19.8% were overweight, 11.5% were underweight and 7% were obese. Their distribution among different specialty colleges was not statistically significant ($p=0.326$, $p=0.347$, and $p=0.903$).

Participants who scored above 20 on the EAT-26 formed 54.5% of obese participants (OR=3.8, 95% CI=2.02-7.28) versus 43% of overweight participants (OR=2.4, 95% CI=1.56-3.71), 23% of normal-weight participants [reference group], and 20% of underweight participants (OR=0.8, 95% CI=0.4-1.5) ($X^2=32.7$, $p=0.0001$). High-risk eating attitudes were highest among obese 70% (OR=3.3, 95% CI=1.68-6.57) followed by overweight

48% (OR=1.28, 95% CI=0.85-1.94), underweight 46% (OR=1.17, 95% CI=0.7-1.96), and then normal weight 42% [reference group], ($X^2=13.5$, $p=0.003$). For students who needed referral, they were 100% of underweight, 76.6% of obese [3.37,1.66-6.8], almost 61% of overweight (OR=1.6, 95% CI=1.06-2.38), and about half of normal-BMI students [reference group], ($X^2=74.2$, $p=0.0001$) (Figure 1).

Table 3 shows that normal weight was at a higher percent among married students 65% than single 61.3%, divorced or widowed participants 50% [2 cases], $p=0.002$. Moreover, normal weight was higher among those living with their parents 62.5% than among those living with their husbands 53%, or with another relative 40% or living alone one case of 4, $p=0.002$. High level of concern for an ED and need for referral were of higher percent among those whom had lower grades in skills test (general abilities) grades <90% (OR=1.78, 95%CI=1.14-2.77), (OR=1.65, 95% CI=1.16-2.35), compared to higher grades 90-100%, $p=0.032$, $p=0.018$.

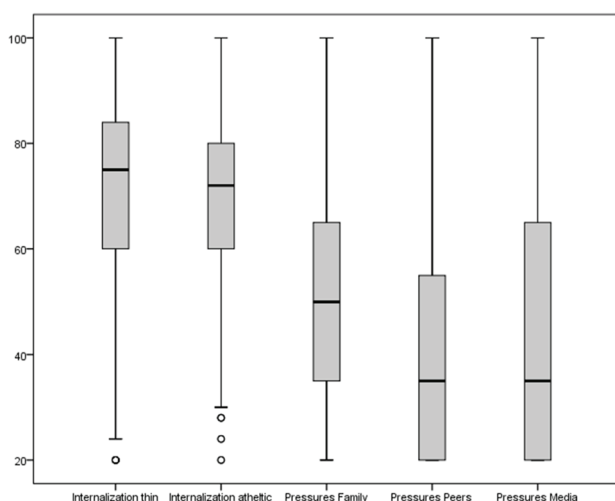
Otherwise, no statistically significant associations were found between the studied demographic and socioeconomic characteristics and any high level of concern for an ED, problematic eating behaviors, or the need for referral to a psychologist to address eating behavior issues.

Figures 2 shows that score percentages of participants' internalizations for thin body shape or for a muscular body ranged from 20-100%, with median scores of 75% and 72%. Higher scores were calculated among those with a high level of concern for an ED compared to participants not to be of concern. A higher median

Table 2 - Distribution of participants in each specialty college, according to level of concern, BMI, and need for referral.

EAT-26	College				Total	P-value
	Medicine	Interior design	Science	Community medicine		
High level of concern	31 (23.8)	11 (24.4)	98 (31.7)	39 (31.2)	179 (29.4)	0.326
No concern	99 (76.2)	34 (75.6)	211 (68.3)	86 (68.8)	430 (70.6)	
<i>Eating behavior</i>						
Risky	55 (42.3)	26 (57.8)	139 (45.0)	57 (45.6)	277 (45.5)	0.347
No risk	75 (57.7)	19 (42.2)	170 (55.0)	68 (54.4)	332 (54.5)	
<i>BMI</i>						
Very underweight	9 (6.0)	5 (8.2)	21 (6.6)	14 (11.2)	49 (7.5)	0.903
Underweight	7 (4.6)	2 (3.3)	12 (3.8)	5 (4.0)	26 (4.0)	
Normal	98 (64.9)	33 (54.1)	200 (62.7)	73 (58.4)	404 (61.6)	
Overweight	30 (19.9)	16 (26.2)	60 (18.8)	24 (19.2)	130 (19.8)	
Obese I	6 (4.0)	3 (4.9)	16 (5.0)	6 (4.8)	31 (4.7)	
Obese II	1 (0.7)	1 (1.6)	8 (2.5)	2 (1.6)	12 (1.8)	
Obese III	0 (0.0)	1 (1.6)	2 (0.6)	1 (0.8)	4 (0.6)	
<i>Referral</i>						
Needs referral	82 (54.3)	39 (63.9)	197 (61.8)	80 (64.0)	398 (60.7)	0.146
No referral	69 (45.7)	22 (36.1)	122 (38.2)	45 (36.0)	258 (39.3)	

EAT-26 - eating attitude test 26, BMI - body mass index

**Figure 2** - Internal and external pressures on participants to maintain their ideal body image or to lose weight.

score for internalization of thin body shape was also found in participants at risk for problematic eating behaviors compared to participants not found to be at risk (Figure 3).

Similarly, higher median scores for internalization of thin body shape or of muscular body shape were also found for participants in need of referral compared to those not in need of referral. Internalization of thin body shape and muscular body shape were highest in

obese participants, followed by overweight participants, normal participants, and then underweight participants. Median scores are shown in Figure 3. The differences between the BMI and internalization for thin body shape groups was found to be statistically significant ($p=0.0001$), but not for muscular body shape ($p=0.203$).

Regarding external pressure from family, the media, and peers to lose weight, the median score percent was higher for family pressure 50%, followed by the media 35%, and peers 35%.

The external pressure from family, media, and peers had higher scores among those at high level of concern for an ED, at high risk of problematic eating behaviors, and those in need of referral than others with no risk or need of referral. The differences in these scores were statistically significant ($p=0.0001$). Median score percentages of the SATAQ-4 data for each group are demonstrated in Figures 2&3.

Discussion. The main finding in this study is that 29.4% of preparatory-year Saudi female students studying at the Imam Abdulrahman bin Faisal University in Dammam, Kingdom of Saudi Arabia, were categorized at high level of concern for an ED, having achieved a score of 20 or more on the EAT-26. This prevalence rate is slightly higher than the 24% reported by Bano, et al.¹¹ From a regional perspective, the 28.8% prevalence rate reported in this study is below the finding reported by Madanat et al,²³ 45.2%

Table 3 - Distribution of sociodemographic data of orientation-year students according to level of concern, BMI, and need for referral.

Characteristic	EAT-26	Behavioral	Referral	BMI			
	High level of concern n (%)	risk n (%)	Needs referral n (%)	Under weight	Normal n (%)	Over-weight	Obese
<i>Marital status</i>							
Single	163 (29.6)	250 (45.4)	351 (59.0)	60 (10.1)	365 (61.3)	123 (20.7)	47 (7.9)
Married	15 (27.8)	24 (44.4)	35 (61.4)	13 (22.8)	37 (64.9)	7 (12.3)	- (-)
Divorced or widow	2 (25.0)	3 (75.0)	3 (75.0)	2 (50.0)	2 (50.0)	- (-)	- (-)
<i>P</i> -value	0.944	0.489	0.765		0.002*		
<i>Monthly Income (SR)</i>							
<5,000	10 (38.5)	15 (57.7)	20 (71.4)	5 (17.9)	14 (50.0)	6 (21.4)	3 (10.7)
5,000-10,000	33 (27.5)	54 (45.0)	77 (62.6)	19 (15.4)	72 (58.5)	20 (16.3)	12 (9.8)
10,001-15,000	46 (27.5)	76 (45.5)	105 (59.3)	26 (14.7)	101 (57.1)	40 (22.6)	10 (5.6)
>15,000	90 (30.4)	132 (44.6)	185 (58.0)	23 (7.2)	211 (66.1)	63 (19.7)	22 (6.9)
<i>P</i> -value	0.646	0.644	0.489		0.075		
<i>Living with</i>							
Parents	163 (28.7)	261 (46.0)	359 (58.6)	65 (10.6)	383 (62.5)	120 (19.6)	45 (7.3)
Husband	11 (34.4)	12 (37.5)	23 (67.6)	10 (29.4)	18 (52.9)	6 (17.6)	0 (0.0)
Alone	3 (75.0)	1 (25.0)	3 (75.0)	0 (0.0)	1 (25.0)	3 (17.6)	0 (0.0)
Others	2 (40.0)	3 (60.0)	4 (80.0)	0 (0.0)	2 (40.0)	1 (20.0)	2 (40.0)
<i>P</i> -value	0.146	0.587	0.567		0.002*		
<i>High school GPA</i>							
90%-100%	172 (29.3)	268 (45.7)	373 (58.9)	69 (10.9)	392 (61.9)	125 (19.7)	47 (7.4)
70%-89%	7 (31.8)	9 (40.9)	16 (69.6)	6 (26.1)	12 (52.2)	5 (21.7)	0 (0.0)
<i>P</i> -value	0.799	0.661	0.308		0.105		
<i>Qudorot (skills)</i>							
90-100%	31 (20.9)	63 (42.6)	87 (50.3)	14 (8.1)	112 (64.7)	37 (21.4)	10 (5.8)
89-70%	143 (32.3)	207 (46.7)	291 (62.7)	57 (12.3)	280 (60.3)	92 (19.8)	35 (7.5)
<70%	5 (27.8)	7 (38.9)	11 (61.1)	4 (22.2)	11 (61.1)	1 (5.6)	2 (11.1)
<i>P</i> -value	0.032*	0.577	0.018*		0.240		
<i>Tahsili</i>							
100-90%	23 (24.7)	42 (45.2)	60 (53.6)	13 (11.6)	71 (63.4)	22 (19.6)	6 (5.4)
89-70%	142 (29.9)	217 (45.7)	303 (60.2)	56 (11.1)	310 (61.6)	99 (19.7)	38 (7.6)
<70%	14 (34.1)	18 (43.9)	26 (63.4)	6 (14.6)	23 (56.1)	9 (22.0)	3 (7.3)
<i>P</i> -value	0.478	0.974	0.369		0.966		
<i>Order in family</i>							
Oldest	47 (34.6)	55 (40.4)	89 (63.1)	18 (12.8)	77 (54.6)	37 (26.2)	9 (6.4)
Middle	108 (28.7)	178 (47.3)	242 (59.0)	49 (12.0)	265 (64.6)	71 (17.3)	25 (6.1)
Youngest	24 (25.3)	43 (45.3)	57 (56.4)	8 (7.9)	59 (58.4)	22 (21.8)	12 (11.9)
Only child	0 (0.0)	1 (50.0)	1 (50.0)	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)
<i>P</i> -value	0.360	0.579	0.695		0.054		
<i>Fathers' education</i>							
Illiterate	2 (33.3)	3 (50.0)	4 (57.1)	0 (0.0)	3 (42.9)	2 (28.6)	2 (28.6)
1 ^o or middle school	24 (28.2)	39 (45.9)	60 (65.2)	16 (17.4)	55 (59.8)	13 (14.1)	8 (8.7)
2 ^{ry} or institute	54 (32.5)	77 (46.4)	109 (62.6)	20 (11.5)	105 (60.3)	38 (21.8)	11 (6.3)
University or postgraduate	99 (28.1)	158 (44.9)	216 (56.4)	39 (10.2)	241 (62.9)	77 (20.1)	26 (6.8)
<i>P</i> -value	0.763	0.984	0.322		0.216		
<i>Mothers' education</i>							
Illiterate	3 (16.7)	8 (44.4)	10 (52.6)	2 (10.5)	13 (68.4)	2 (10.5)	2 (10.5)
1 ^o or middle school	53 (37.1)	74 (51.7)	100 (66.7)	20 (13.3)	88 (58.7)	28 (18.7)	14 (9.3)
2 ^{ry} or institute	48 (24.6)	81 (41.5)	121 (59.3)	23 (11.3)	129 (63.2)	40 (19.6)	12 (5.9)
University or postgraduate	75 (29.6)	114 (45.1)	158 (55.8)	30 (10.6)	174 (61.5)	60 (21.2)	19 (6.7)
<i>P</i> -value	0.055	0.319	0.162		0.902		

EAT-26 - eating attitude test 26, BMI - body mass index, *statistically significant *p*-value<0.05

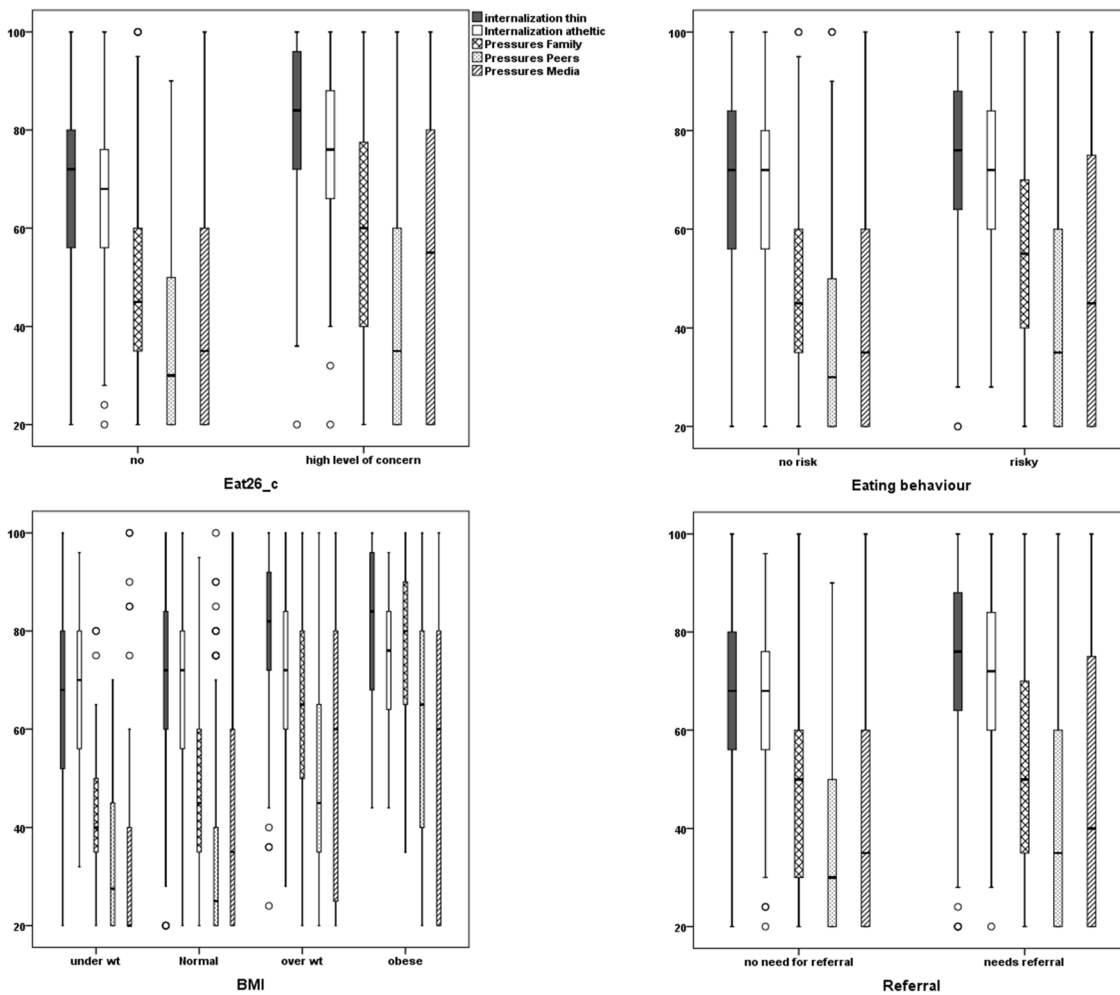


Figure 3 - Relation between SATAQ-4 and high level of concern, BMI and need for referral. BMI - body mass index, SATAQ-4 - socio-cultural attitudes toward appearance questionnaire

of female college students in Jordan required screening for EDs but above the finding by Schulte et al,⁷ 20% prevalence rate among female students studying at 2 other universities in Abudabi and Sharga in the United Arab Emirates.

Explaining the differences in ED prevalence rates among young women living in the Kingdom of Saudi Arabia or the Middle East is broadly more difficult due to the lack of research studies of the epidemiology of EDs in the region. From a cultural perspective, Miller et al²⁴ claims that ED prevalence rates will naturally vary across different races and ethnicities and change over time due to the evolution of national culture. This claim is supported in the findings of a systematic review conducted by Keel et al⁵ that “weight concerns may be a culturally bound phenomenon, restricted to socio-

historical contexts that idealize thinness and denigrate fatness.”

The findings in this study highlight that EDs are not culture-specific. Much has been written in recent decades to dispute the conceptualization that EDs among women are primarily a Western phenomenon.⁵ In fact, Campbell et al²⁵ have suggested, at the very least, “risk of an ED is part genetic and part environmental.” It may be concluded that the prevalence rate of EDs among young Saudi women may be linked to unique sociocultural factors and different levels of vulnerability toward EDs the study cohort experiences.

The higher prevalence of concerns for an ED among single adult female university students in this study is similar to the finding by Madanat et al²³ that single, college-aged women studying in Jordan were more

prone to external pressure regarding eating than their married counterparts. Eating disorders are complex phenomena in which eating behavior problems are linked to behavioral, cognitive, and emotional factors.²⁶ Within this dynamic, marital status and interpersonal relationships more broadly are identified as contributing factors to maintaining EDs. Martínez-González et al,²⁷ claimed that solitary eating can be a strong independent risk factor for developing an ED, and this may explain in part the findings in this study.

Family pressure represented the strongest external pressure to lose weight that Saudi female orientation-year students experienced. The influence of family (and peers) on eating behaviors and body-image dissatisfaction among females and males was also reported by Quiles et al,¹³ in their meta-analysis of studies examining this relationship. This finding highlights the importance of developing a deeper understanding of how family influence within specific cultural contexts act as a moderating effect for the development of an ED. For instance, Zeeni et al¹⁷ pointed to the role of social customs and cultural expectations as the pressure from family members exert the person to engage in certain eating behaviors.

The media also represented a significant external pressure to lose weight for Saudi female orientation-year students with EAT-26 scores indicating high level of concern about an ED. A number of studies from different fields of research, including EDs, health psychology, and mass communication, pointed to the role of mass media as a pivotal source of information and reinforcement regarding the nature of the thin beauty ideal, the level of importance it is assigned, and how to achieve it.²⁷ One of the key implications of the prominent role of the media is that the globalization of media networks and the increasing prevalence of Western ideals promoted through these media outlets will result in a greater proliferation of the Western ideal body image in countries all around the world.^{27,28} The finding that the media might function as a leading external pressure source on adult Saudi female university students suggests that, similar to parents, the media presents a principal social agent for this cohort. That is, the media is a platform for the transmission of ideas, values, norms, attitudes, and behaviors that socialize and construct the social reality.²⁹

Finally, this study found that peers are also a source of external pressure on Saudi adult female university students to lose weight. To explain this finding, the case might be that some cultural contexts can lead young women to be more sensitive to and influenced

by comments from peers regarding body image than to some other cultural contexts. This implies that the sociocultural context might influence the level of importance placed on social judgments which, in the context of EDs, can translate into the acceptance of certain eating behaviors.

Limitations. It should be noted that the questionnaire instrument designed and implemented for data collection did not consider different scoring if the participants had a chronic disease, were already diagnosed as having an ED, or were on any medications for mood stabilization. Such conditions among the study participants may influence their eating behaviors and BMI measures.

In conclusion, eating disorders continue to be a problem among populations in most societies around the world. In turn, important implications emerge from the findings in this study of a high rate of concern for EDs among Saudi adult female university students and the potential influence of external sociocultural pressure on them to lose weight. Overall, more than one-third of the female students in this study received scores on the EAT-26 that qualified them to be concerned about having an ED. Almost one-half demonstrated problematic eating behaviors, more than one-half required referral to a psychologist to address eating behavior issues, and approximately one-third had a BMI outside of normal weight. Based on these results, this study recommends that suitable screening tools (namely, EAT-26 and SATAQ-4) be used in the university clinic for early detection of an ED and for timely referral to support intervention and health education programs regarding healthy nutrition addressing students and provided in the media.

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Appendix 1 - DSM-5 diagnostic criteria for eating disorders.

Disease	DSM-5 criteria
Anorexia nervosa	<ol style="list-style-type: none"> 1. Persistent restriction of food intake leading to significant low body weight (in context of what is minimally expected for age, sex, developmental trajectory, and physical health) . 2. Either an intense fear of gaining weight or of becoming fat, or persistent behavior that interferes with weight gain (even though significantly low weight). 3. Disturbance in the way one's body weight or shape is experienced, undue influence of body shape and weight on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight.
Bulimia Nervosa	<ol style="list-style-type: none"> 1. Eating large amount of food in a discrete period of time . 2. A sense of lack of control over eating during the episode. 3. Recurrent inappropriate compensatory behavior in order to prevent weight gain. Like, self-induced vomiting, misuse of laxatives, diuretics, or other medications, fasting, or excessive exercise. 4. Both occur, on average, at least once a week for three months. 5. Self-evaluation is unduly influenced by body shape and weight. 6. The disturbance does not occur exclusively during episodes of Anorexia Nervosa.
Binge Eating Disorder	<ol style="list-style-type: none"> 1. Eating large amount of food in a discrete period of time . 2. A sense of lack of control over eating during the episode. 3. eating much more rapidly than normal 4. eating until feeling uncomfortably full 5. eating large amounts of food when not feeling physically hungry 6. eating alone because of feeling embarrassed by how much one is eating 7. Disgusted feeling with oneself, very guilty and depressed. 8. at least once a week for three months

Appendix 2 - EAT-26 Questionnaire (English).

Eating Attitudes Test (EAT-26)[©]

Instructions: This is a screening measure to help you determine whether you might have an eating disorder that needs professional attention. This screening measure is not designed to make a diagnosis of an eating disorder or take the place of a professional consultation. Please fill out the below form as accurately, honestly and completely as possible. There are no right or wrong answers. All of your responses are confidential.

Part A: Complete the following questions:

1) Birth Date Month: Day: Year: 2) Gender: Male Female

3) Height Feet : Inches:

4) Current Weight (lbs.): 5) Highest Weight (excluding pregnancy):

6) Lowest Adult Weight: 7: Ideal Weight:

Part B: Check a response for each of the following statements:

	Always	Usually	Often	Some times	Rarely	Never
1. Am terrified about being overweight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Avoid eating when I am hungry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Find myself preoccupied with food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Have gone on eating binges where I feel that I may not be able to stop.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Cut my food into small pieces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Aware of the calorie content of foods that I eat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Feel that others would prefer if I ate more.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Vomit after I have eaten.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Feel extremely guilty after eating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Am preoccupied with a desire to be thinner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Think about burning up calories when I exercise.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Other people think that I am too thin.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Am preoccupied with the thought of having fat on my body.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Take longer than others to eat my meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Avoid foods with sugar in them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Eat diet foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Feel that food controls my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Display self-control around food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Feel that others pressure me to eat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Give too much time and thought to food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Feel uncomfortable after eating sweets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Engage in dieting behavior.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Like my stomach to be empty.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Have the impulse to vomit after meals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Enjoy trying new rich foods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part C: Behavioral Questions:
In the past 6 months have you:

	Never	Once a month or less	2-3 times a month	Once a week	2-6 times a week	Once a day or more
A Gone on eating binges where you feel that you may not be able to stop? *	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B Ever made yourself sick (vomited) to control your weight or shape?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D Exercised more than 60 minutes a day to lose or to control your weight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E Lost 20 pounds or more in the past 6 months	Yes <input type="checkbox"/>		No <input type="checkbox"/>			

* Defined as eating much more than most people would under the same circumstances and feeling that eating is out of control

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Appendix 3 - SATAQ-4 Questionnaire (English).

Sociocultural Attitudes Towards Appearance Questionnaire – 4

Directions: Please read each of the following items carefully and indicate the number that best reflects your agreement with the statement.

Definitely Disagree = 1
 Mostly Disagree = 2
 Neither Agree Nor Disagree = 3
 Mostly Agree = 4
 Definitely Agree = 5

	Definitely Disagree				Definitely Agree
1. It is important for me to look athletic.	1	2	3	4	5
2. I think a lot about looking muscular.	1	2	3	4	5
3. I want my body to look very thin.	1	2	3	4	5
4. I want my body to look like it has little fat.	1	2	3	4	5
5. I think a lot about looking thin.	1	2	3	4	5
6. I spend a lot of time doing things to look more athletic.	1	2	3	4	5
7. I think a lot about looking athletic.	1	2	3	4	5
8. I want my body to look very lean.	1	2	3	4	5
9. I think a lot about having very little body fat.	1	2	3	4	5
10. I spend a lot of time doing things to look	1	2	3	4	5

Answer the following questions with relevance to your Family (include: parents, brothers, sisters, relatives):

11. I feel pressure from family members to look thinner.	1	2	3	4	5
12. I feel pressure from family members to improve my appearance.	1	2	3	4	5
13. Family members encourage me to decrease my level of body fat.	1	2	3	4	5
14. Family members encourage me to get in better shape.	1	2	3	4	5

Answer the following questions with relevance to your Peers (include: close friends, classmates, other social contacts):

15. My peers encourage me to get thinner.	1	2	3	4	5
16. I feel pressure from my peers to improve my appearance.	1	2	3	4	5
17. I feel pressure from my peers to look in better shape.	1	2	3	4	5
18. I get pressure from my peers to decrease my level of body fat.	1	2	3	4	5

Answer the following questions with relevance to the Media (include: television, magazines, the Internet, movies, billboards, and advertisements):

19. I feel pressure from the media to look in better shape.	1	2	3	4	5
20. I feel pressure from the media to look thinner.	1	2	3	4	5
21. I feel pressure from the media to improve my appearance.	1	2	3	4	5
22. I feel pressure from the media to decrease my level of body fat.	1	2	3	4	5

Note: SATAQ-4 Scoring:

Internalization – Thin/Low body fat: 3, 4, 5, 8, 9

Internalization – Muscular/Athletic: 1, 2, 6, 7, 10

Pressures – Family: 11, 12, 13, 14

Pressures – Peers: 15, 16, 17, 18