

# Eating disorders among Moroccan medical students: cognition and behavior

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**Introduction and aim:** Eating disorders (EDs) are complex, multifactorial diseases linked to biological, developmental, psychological, and sociocultural factors. Medical students are among subjects at high risk of EDs. The aim of the present investigation was to evaluate EDs among 710 Moroccan medical students with a focus on cognition and behavior related to EDs.

**Methods:** Sociodemographic, economic, and clinical data were collected. Validated questionnaires, such as the SCOFF (Sick, Control, One Stone, Fat, Food) questionnaire and the Eating Disorder Inventory 2 (EDI2), were administered.

**Results:** The male:female ratio was 0.53, mean age was 21±2 years, 11.1% of participants were underweight, 13.4% were overweight, and 1.8% were obese. A middle socioeconomic level was found in 84.9% of cases. The prevalence of EDs in students was 32.8% (37.6% among females and 23.7% among males) and that of weight-control behaviors 18.5%. Increased body-mass index values were significantly associated with dieting ( $P<0.001$ ), fasting ( $P=0.044$ ), and the use of appetite suppressants ( $P=0.037$ ).

**Conclusion:** It appears that the impact of EDs is high, affecting a third of medical students, with significant use of harmful weight-control behaviors. We also found that dimensions of bulimia, perfectionism, body dissatisfaction, and ineffectiveness, parts of the core of EDs, were found in future medical practitioners.

**Keywords:** eating disorders, cultural factors, medical students, screening, body image, body-mass index

## Introduction

Eating disorders (EDs) are complex, multifactorial diseases linked to a variety of parameters, including biological, developmental, psychological, and sociocultural factors,<sup>1-6</sup> among others. While initially it was thought that only white women from wealthy contexts could be affected by EDs, due to the cultural impact on the perception of health and the self in relation to the physical body (EDs as “culture-bounded” disorders),<sup>7</sup> EDs have been reported and described also in non-Western populations, including Morocco.<sup>8,9</sup> In these settings, especially young adults and teenagers seem to attribute particular importance to their physical appearance, being influenced by the Western models of body shape and slimness.<sup>10</sup> Various factors contribute to the adoption of such standards: in particular, mass media and new information and communication technologies play a major role, giving distorted and potentially misleading messages concerning nutrition, encouraging on the one hand excessive food uptake and consumption, while on the other promoting the ideal of a slim body typical of media stars and celebrities.<sup>10</sup>

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These contradictory messages mostly target women more than men, although this difference has weakened over time. Subthreshold/subclinical and clinical EDs have an estimated lifetime prevalence varying between 0.21% and 2.22%, depending on the diagnostic criteria used and type of ED.<sup>11</sup> Many studies have documented increasing inappropriate attitudes and behaviors toward eating and body image among young non-Western women, with the burden expected to rise in the next few decades in low- and middle-income countries.<sup>12</sup>

Medical students are among those at high risk of developing EDs.<sup>13</sup> According to a recent systematic review of the literature and meta-analysis,<sup>13</sup> which pooled 19 cross-sectional studies (5,722 participants from Brazil, China, India, Malaysia, Pakistan, Turkey, UK, and the US), the overall prevalence of ED risk was 10.4% (95% CI 7.8%–13.0%). In more detail, prevalence estimates between studies ranged from 2.2% (China) to 29.1% (India). Several factors may explain such high rates of EDs among medical students, such as being adolescents/young adults, academic stress, workload, and exposure to diseases and death.<sup>13</sup> However, little is known about the impact of EDs on future medical practitioners in Morocco. As such, the aim of the present investigation was to evaluate EDs among medical students with a focus on ED-related cognition and behavior and associated determinants.

## Methods

### Participants and procedures

This study was conducted between January and April 2013. Recruitment was done through convenience sampling of medical students from the medical faculty and the University Hospital of Fez (Morocco). The study included medical students from the first to the sixth year. We excluded from the study students who did not agree to take part in the investigation, partially filled in the questionnaire (<80% of items), and who were absent at the time of the research.

Data were collected anonymously, and thorough explanations were provided to each student on the purpose of the study, definition of EDs, and their classification according to the *Diagnostic and Statistical Manual of Mental Disorders IV* – text revision. Each participant signed a written, informed consent. The present investigation was carried out according to the 1964 Declaration of Helsinki and its subsequent amendments. Ethical clearance for the protocol study was obtained from Sidi Mohammed Ben Abdellah University of Fez, Fez, Morocco. A pilot feasibility study was conducted with 20 students to test the study protocol.

## Data collection

### Sociodemographic and economic data

These data included age, sex, marital status, and number of children (if any), monthly income of the family or household of the subject, and educational level. These variables were clustered together, and based on the results of the clustering analysis, socioeconomic level was stratified into low, middle, and high.

### Clinical data

These data included clinical, personal, and familial history of subjects. We also estimated body-mass index (BMI) values calculated by weight/(height)<sup>2</sup>. Weight was expressed in kilograms and height in meters. Subjects were stratified accordingly into underweight, normal weight, overweight, and obese subjects, according to the World Health Organization's interpretation of BMI thresholds.

### Weight-control behavior

We investigated restrictive behaviors (including diet, fasting, and use of appetite suppressants), and purgative behaviors (including vomiting and use of laxatives and diuretics).

### SCOFF questionnaire

The SCOFF (sick, control, one stone [6.5 kg], fat, food) questionnaire is a highly accurate instrument characterized by sound psychometric properties. It has been translated and validated in French, and this version is recommended by the French National Authority for Health (Haute Autorité de Santé). SCOFF is considered a simple, effective ED-screening tool, especially when used in student populations. The French version of the questionnaire is characterized by sensitivity of 94.6%, specificity of 94.8%, positive predictive value of 65%, and negative predictive value of 99%.<sup>14</sup> SCOFF is an acronym of five items of the questionnaire: intentional vomiting (“Do you make yourself sick because you feel uncomfortably full?”), loss of control over diet (“Do you worry that you have lost control over how much you eat?”), weight loss (“Have you recently lost more than 1 st [6.5 kg] in a 3-month period?”), body dissatisfaction (“Do you believe yourself to be fat when others say you are too thin?”), and intrusive thoughts about food (“Would you say that food dominates your life?”). Possible answers to the questions are dichotomous (yes/no, 2-point Likert scale), and two positive responses are highly predictive of EDs. In the present study, subjects with a positive SCOFF score were defined as being at risk of EDs.

### Eating Disorder Inventory

The Eating Disorder Inventory 2 (EDI2) was developed by Garner et al<sup>15</sup> within a conceptual framework that assumes

that EDs are multifactorial and multidimensional. EDI2 is a comprehensive clinical assessment of both cognitive and behavioral profiles of subjects concerning eating behaviors and associated conduct. The validity of this inventory was found to be excellent, because all scales were able to differentiate subjects with EDs from control subjects.<sup>15</sup> The questionnaire comprises 91 items, and explores eleven dimensions: namely, drive for thinness, bulimia, body dissatisfaction, ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, maturity fears, impulse regulation, asceticism, and social insecurity. In the present study, given the aim of our investigation, we decided to focus on four:

1. bulimia subscale (EDI-B), which allows exploration of cognition and behavior related to uncontrolled alimentation
2. ineffectiveness subscale (EDI-I), which highlights low self-esteem and measures feelings of personal efficacy, solitude, inadequacy, and lack of control over one's own life
3. perfectionism subscale (EDI-P), which allows exploration of perfectionism traits related to EDs
4. body-dissatisfaction subscale (EDI-BD), which measures dissatisfaction with the overall silhouette and specific areas of the body that constitute a concern for subjects with disturbed eating behavior

Answers were rated on a scale of 6 points and then calculated on a 4-point scale: each item was evaluated in terms of frequency of behavior or thought, from "Always" to "Never".

## Statistical analysis

Data were analyzed using SPSS version 13.0. Qualitative variables are expressed as numbers and percentages, and quantitative variables as average  $\pm$  SD or median and interquartile range. The nonparametric Mann–Whitney test was used for comparisons of abnormally distributed quantitative variables, and Pearson's  $\chi^2$  test or Fisher's exact test carried out to compare qualitative variables. The threshold of significance was set at  $P < 0.05$ .

## Results

### Characteristics of subjects

Among a total of 730 questionnaires submitted, 710 were retained (97.3%). Only 20 questionnaires were excluded because they had been partially filled in. The sex ratio (male:female) was 0.53. The mean age was 21 (range: 16–31) years and mean BMI 22.9 kg/m<sup>2</sup>, with 11.1% of cases being underweight, 13.4% overweight, and 1.8% obese. A medium

**Table 1** Sample characteristics

Characteristics	
<b>Age (years), mean <math>\pm</math> SD</b>	21.27 $\pm$ 2.02
<b>Sex, n (%)</b>	
Male	248 (34.9)
Female	462 (65.1)
<b>Level of study, n (%)</b>	
Year 1	197 (27.7)
Year 2	92 (13)
Year 3	137 (19.3)
Year 4	180 (25.4)
Year 5	83 (11.7)
Year 6	21 (3)
<b>Socioeconomic level, n (%)</b>	
Low	24 (3.4)
Middle	603 (84.9)
High	62 (8.7)
Not specified	21 (3)
<b>Body-mass index, n (%)</b>	
Underweight	79 (11.1)
Normal	465 (65.5)
Overweight	95 (13.4)
Obese	13 (1.8)
Not specified	58 (8.2)

socioeconomic level was found in most students (84.9%; Table 1).

### EDs and weight-control behavior among medical students

The prevalence of ED-related behavior and practices in students was 32.8% (37.6% among females, 23.7% among males). Prevalence was higher among females ( $P < 0.001$ ). Weight-control behavior was found in 18.5% of students: 6.5% declared being on a diet, 7% used fasting, 3% used appetite suppressants, and 1.7% induced vomiting, besides laxatives and diuretics, which were found to a lesser extent (Table 2).

We could not find significant differences between males and females in terms of weight-control behavior. While socioeconomic level did not influence such practices, increased BMI was significantly associated with dieting ( $P < 0.001$ ), fasting ( $P = 0.044$ ), and use of appetite suppressants ( $P = 0.037$ ; Table 2). Weight-control behavior was significantly ( $P < 0.001$ ) higher among subjects scoring higher for EDs (34.2%) vs those scoring lower (11.9%). On univariate analysis, dieting ( $P < 0.001$ ), fasting ( $P < 0.001$ ), induced vomiting ( $P = 0.006$ ), and appetite suppressants ( $P = 0.001$ ) were associated with these practices. On multivariate analysis adjusting for confounding factors, only dieting (OR 2.18,  $P = 0.029$ ), fasting (OR 3.23,  $P < 0.001$ ), induced vomiting (OR 4.56,  $P = 0.030$ ), and appetite suppressants (OR 3.65,  $P = 0.017$ ) were associated with EDs (Table 3).

**Table 2** Association of weight-control behavior with sex, socioeconomic level, and body-mass index

	Sex			Socioeconomic level					Body-mass index				
	Male, n (%)	Female, n (%)	Total, n (%)	P	Low, n (%)	Middle, n (%)	High, n (%)	P	Underweight, n (%)	Normal, n (%)	Overweight, n (%)	Obese, n (%)	P
Dieting	13 (5.3)	33 (7.2)	46 (6.5)	0.209	1 (4.2)	36 (6)	7 (11.3)	0.21	1 (1.3)	20 (4.3)	12 (12.6)	5 (38.5)	<0.001
Fasting	14 (5.6)	36 (7.8)	50 (7)	0.181	2 (8.3)	43 (7.1)	4 (6.5)	0.877	2 (2.5)	27 (5.8)	12 (12.6)	0	0.044
Vomiting	2 (0.8)	10 (2.2)	12 (1.7)	0.15	0	10 (1.7)	1 (1.6)	0.999	0	9 (1.9)	3 (3.2)	0	0.432
Laxatives	0	5 (1.1)	5 (0.7)	0.116	0	4 (0.7)	1 (1.60)	0.488	1 (1.3)	3 (0.6)	1 (1.1)	0	0.471
Appetite suppressant	6 (2.4)	15 (3.2)	21 (3)	0.357	2 (8.3)	17 (2.8)	1 (1.6)	0.236	0	12 (2.6)	7 (7.4)	0	0.037
Diuretics	1 (0.5)	4 (1)	5 (0.8)	0.419	0	4 (0.8)	0	0.999	0	2 (0.5)	1 (1.1)	1 (7.7)	0.097

**Table 3** Evaluation of weight-control behavior by univariate and multivariate analyses

	SCOFF		Univariate analysis				Multivariate analysis			
	Negative, n (%)	Positive, n (%)	P	OR	95% CI	P-value	Adjusted OR	95% CI	Superior	
	Inferior	Superior	Inferior	Superior	Inferior	Superior	Inferior	Superior		
Dieting	19 (4)	27 (11.7)	<0.001	3.16	1.719	5.819	0.029	2.18	1.085	4.398
Fasting	17 (3.6)	33 (14.3)	<0.001	4.48	2.438	8.233	<0.001	3.23	1.696	6.163
Vomiting	3 (0.6)	9 (3.9)	0.006	6.36	1.706	23.740	0.030	4.56	1.154	18.008
Laxatives	1 (0.2)	4 (1.7)	0.059	8.33	0.926	74.997	0.337	3.17	0.301	33.440
Appetite suppressant	6 (1.3)	15 (6.5)	0.001	5.42	2.073	14.152	0.017	3.65	1.266	10.555
Diuretics	2 (0.5)	3 (1.5)	0.234	2.98	0.494	17.963	0.914	1.11	0.156	7.979

Abbreviation: SCOFF, sick, control, one stone (6.5 kg), fat, food.

## EDI2 for medical students

Scores on the EDI-B ( $P<0.001$ ), EDI-BD ( $P<0.001$ ), EDI-I ( $P<0.001$ ), and EDI-P ( $P=0.003$ ) subscales were higher in subjects with ED-related behavior (Table 4). Male students showed no significant difference in comparison with female students on the EDI-B or EDI-BD. However, EDI-I ( $P=0.026$ ) and EDI-P ( $P=0.001$ ) scores were significantly higher among female students. Socioeconomic level was not associated with any of the EDI subscales.

Increased BMI was associated with the EDI-B ( $P=0.001$ ) and EDI-BD ( $P<0.001$ ) subscales, but not significantly with EDI-I or EDI-P.

## Discussion

The goal of this work was to investigate the ED-related cognitive-behavioral background among medical students. We found that ED-associated practices were quite widespread (affecting approximately a third of the sample), with 18.5% of the students declaring that they used weight-control strategies that might threaten their health. While the extant scholarly literature is generally focused on females, we included also male subjects. We found a nonnegligible prevalence rate among males (23.7%), without significant difference regarding weight-control strategies.

Our investigation has demonstrated that the use of weight-control behavior, such as diets, fasting, self-induced vomiting, and appetite suppressants, is quite widespread among medical students. Increase in BMI was significantly related to restrictive weight-control strategies. In the literature, few studies have assessed ED prevalence among students. A Moroccan study carried out among high school students found a prevalence of 0.8% for bulimic syndrome,<sup>8</sup> whereas another study conducted among students from four Moroccan university faculties found a prevalence of 4% for bulimic syndrome and 63.8% for unusual eating behaviors, with a clear predominance among medical students.<sup>9</sup> A Tunisian survey found that 10% of medical students were adopting bulimic behaviors.<sup>16</sup>

Literature data confirmed a close relationship between body image and eating behavior. Self-critical body image is part of the clinical picture of patients with subthreshold/subclinical forms and diagnostic criteria of anorexia nervosa. Studies have shown that 25%–40% of students are concerned about their body image and wish to control their weight and food intake.<sup>17–19</sup> Our results are similar to these findings. There was no significant difference between sexes, although it has been reported that girls tend to have more body dissatisfaction than boys and express more satisfaction when they are underweight compared to normal-weight and overweight subjects.<sup>17–19</sup>

**Table 4** Evaluation of the EDI2 subscales by ED-related practices, sex, socioeconomic level, and body-mass index

Subscale	SCOFF		Sex		Socioeconomic level			Body mass index				P			
	Positive, Md (IQR)	Negative, Md (IQR)	P	Male, Md (IQR)	Female, Md (IQR)	P	Low, Md (IQR)	Middle, Md (IQR)	High, Md (IQR)	P	Underweight, Md (IQR)		Normal, Md (IQR)	Overweight, Md (IQR)	Obese, Md (IQR)
EDI2-B	0 (0–2)	1 (0–4)	<0.001	0 (0–2)	0 (0–2)	0.387	1 (0–2)	0 (0–2)	0.5 (0–2)	0.865	0 (0–2)	0 (0–2)	1 (0–4.25)	4 (0.75–6)	0.001
EDI2-BD	2 (0–6)	7.5 (2.25–13)	<0.001	4 (1–8.5)	4 (0–10)	0.831	3 (0.25–9.75)	4 (0–9)	5 (0–11.75)	0.418	1 (0–5)	3 (0–7)	9 (4–14)	20 (14–24)	<0.001
EDI2-I	1 (0–3)	2 (0–5)	<0.001	1 (0–3)	2 (0–5)	0.026	1 (0–3.75)	1 (0–4)	1 (0–3)	0.943	2 (0–5)	1 (0–4)	2 (0–4)	3 (1–6)	0.302
EDI2-P	9 (5.5–12)	10 (7–13)	0.003	8 (5–11)	10 (6–13)	0.001	7 (3.75–12.25)	9 (6–12)	8.5 (6–12)	0.294	9 (7–13)	9 (6–12)	9 (6–12)	9 (6–11)	0.55

Abbreviations: EDI2, Eating Disorder Inventory 2; Md, median; B, bulimia; BD, body dissatisfaction; I, ineffectiveness; IQR, interquartile range; P, perfectionism; SCOFF, Sick, Control, One Stone, Fat, Food questionnaire.



Male subjects demonstrate that body dissatisfaction is linked to overweight and obesity, and not to leanness.<sup>20,21</sup> Studies have underlined that subjects using weight-control strategies are more dissatisfied with their bodies than other subjects.<sup>22,23</sup> On the other hand, body dissatisfaction and BMI predict EDs in both sexes.<sup>20,21</sup> Body perfectionism, either self-oriented or socially influenced, is indeed connected with purgative or restrictive behavior. On the other hand, it is necessary to specify that perfectionism may not be systematically related to pathological behaviors and EDs, and as such should be differentiated between adaptive and maladaptive. Dysfunctional perfectionism, together with anxious–depressive symptoms in medical students, can be associated with the development of EDs, leading to feelings of ineffectiveness.<sup>24,25</sup>

Furthermore, classically EDs patients come from wealthy backgrounds and settings.<sup>1</sup> However, in our investigation socio-economic level was not a predictor of EDs. This could reflect cultural differences between Morocco and Western countries. Further studies should replicate our findings with a focus on the role of mass media and information and communication technologies in a more globalized and interconnected society.

Our investigation has some strengths, such as the sample size. However, our work presents also several limitations, including the single-center study design and the use of some (and not all) subscales of the EDI2. Future studies should explore ED-related practices and behavior among other future health actors, such as pharmacists or nurses.

## Conclusion

We found a risk of EDs reaching a third of medical students, with significant use of harmful weight-control behavior. We also found that the dimensions of bulimia, perfectionism, body dissatisfaction, and ineffectiveness, parts of the core of EDs, were present in future practitioners. However, due to the aforementioned shortcomings, further research in the field is needed, especially among Moroccan individuals. A better understanding of certain features of EDs found in nonclinical populations would make possible a high level of specificity and thus efficiency in the development of prevention and screening programs and even treatment.

## Disclosure

The authors report no conflicts of interest in this work.

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