# Validation of the Arabic version of the Eating Attitude Test in Lebanon: a population study

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## Abstract

*Objectives:* To validate an Arabic version of the Eating Attitude Test (EAT-26) and identify factors (such as depression, stress, anxiety and body dissatisfaction) that might be associated with disordered eating among a sample of the Lebanese population.

*Design:* Cross-sectional study.

*Setting:* All Lebanese governorates.

*Participants:* A total of 811 participants randomly selected participated in this 5-month study (January–May 2018).

*Results:* The EAT-26 scale items converged over a solution of six factors that had an eigenvalue over 1, explaining a total of 60·07 % of the variance (Cronbach's $\alpha = 0.895$). The prevalence of disordered eating attitudes was 23·8 %. Higher EAT-26 scores (disordered eating attitudes) were significantly associated with higher depression ($\beta = 0.325$), higher emotional eating ($\beta = 0.083$), daily weighing ($\beta = 3.430$), higher physical activity ($\beta = 0.05$), starving to reduce weight ($\beta = 4.94$) and feeling pressure from TV/magazine to lose weight ($\beta = 3.95$).

*Conclusions:* The Arabic version of EAT-26 can be a useful instrument for screening and assessing disordered eating attitudes in clinical practice and research. Some factors seem to be associated with more disordered eating attitudes among participants for whom psychological counseling may be needed. Yet, our findings are considered preliminary, and further studies are warranted to confirm them.

'Eating Attitude' is a term used globally to describe the beliefs, thoughts, feelings and behaviours related to food[1]. People develop positive or negative attitudes leading to actions consistent with cognitions and emotions towards food. Diverse approaches to food might have consequences on general well-being, and psychological components of eating attitudes might be important determinants of health.

Rapid changes in food choices and behaviours have occurred lately, with people desiring to stay slim[2–5]. Unhealthy eating attitudes, related to abnormal preoccupations with food and weight, such as continuous concerns about controlling and losing weight, food restriction and amplified anger and bad temper when hungry, had quickly emerged and resulted in severe eating disorders[6,7]. Eating disorders, defined as abnormal or disturbed eating behaviours, are highly encountered and include harmful eating attitudes with severe distress or concerns about body weight or shape[8]. According to many studies, the prevalence of unfavourable eating attitudes varies between 10 and 16 % in America[9,10], 3–13·7 % in Europe[11] and 4–30 % in Asia[2,5,12,13]. Arab countries, especially Lebanon, are affected by westernisation and tend to adopt western traditions in everything, including eating attitudes. Thus, Lebanese people (mostly women) favour fasting or restrained eating to lose weight[6].

Psychological factors and emotional status play very important roles in food choices and behaviours[14]. Negative emotions could have an impact on the behaviour

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of individuals by reducing their actions, which usually involves avoidance of the stimulus or the activity[14]. Emotional regulation can affect the eating attitude as it plays an influential role in daily food intake and may cause what is known as 'emotional overeating'[15]. Furthermore, stress (often coupled with depression and anxiety when chronic) and anxiety are also associated with disordered eating[16,17]. Indeed, studies have shown that anxiety appears much earlier than eating disorders, making it a cause of binge eating[18].

Moreover, anxiety showed some association with fasting, especially 'social appearance anxiety', where people get anxious about what society may think of their appearance. Studies have shown that a higher frequency of use of social media resulted in high rates of eating disorders: pressure may lead to body dissatisfaction, lowered self-esteem and urge to become extremely skinny, especially in women[6,7,19]. Consequently, the frequency of restrained eating is increasing worldwide; people stop eating voluntarily to lose weight and become skinny[17], without knowing that this will increase the food intake after some time, leading to binge eating again.

Furthermore, studies have demonstrated that intense physical activity is linked to eating disorders[20,21]. An excessive workout is often used as an approach to cope with emotional conditions, either by reinforcing mood or by avoiding destructive thoughts related to not exercising[22]. On the other hand, people with food addiction are less active and prefer spending their leisure time sitting rather than walking or doing any physical activity[23]. Also, education level has an impact on food behaviours and attitudes[24–26]: uneducated persons tend to consume large amounts of junk, high energetic content food[26], while more educated people read and analyse health facts and choose healthier lifestyles[24].

In Lebanon, there is a need to assess the risk of eating-related diseases and eating attitudes using appropriate tools; one of the most used is the Eating Attitude Test (EAT-26)[27]. The EAT-26 was designed to diagnose anorexia nervosa but has been found useful in non-clinical settings to screen for disordered eating attitudes, particularly atypical preoccupation with food and weight[27]. This test was validated in Mexico as a secondary prevention tool to modify public health programmes[28], and in Spain[29,30], where it is known as Disorder Eating Attitude Scale. It was also validated as a very sensitive method in Italy[31], as a sensitive and specific useful tool in non-western countries[32] and as the most reliable and commonly used self-report tool for eating disorders worldwide. Additionally, the EAT-26 was validated in Arabic among a representative sample of female students in Riyadh, Saudi Arabia[33]. However, it was not validated in the Lebanese dialect and among the general population; hence, the importance of its validation to use it as a screening tool for disordered eating attitudes.

Therefore, the primary objective of the study is to validate the Arabic version of the EAT-26 and identify factors (such as depression, stress, anxiety, emotion regulation and body dissatisfaction) that might be associated with disordered eating among a sample of the Lebanese population.

## Methods

### Participants

This cross-sectional study conducted between January and May 2018, enrolled 811 community dwelling participants using a proportionate random sample from all Lebanese governorates (Beirut, Mount Lebanon, North, South and Bekaa). Each governorate is divided into Caza (stratum). Two villages were randomly selected from the list of villages provided by the Central Agency of Statistics in Lebanon. Participants were randomly selected from each village. Prior to participation, individuals were briefed on the study objectives and methodology and were assured of the anonymity of their participation. No financial reward was given to the participants, and they had the right to accept or refuse to participate in the study. Those who agreed to participate were asked to read and sign a written consent form.

All participants above 18 years of age were eligible to participate. Excluded were those who refused to fill out the questionnaire and those suffering from cognitive impairment as reported by a family member. Data collection was performed through personal interviews with participants by a trained study-independent clinical psychologist, who clinically evaluated the level of psychiatric illness to exclude participants with psychiatric problems. The same methodology was used in previous papers from this project[34–36].

### Minimal sample size calculation

According to Comrey and Lee[37], ten observations are needed for each scale item for the validation process. Since the EAT includes twenty-six items, a minimal sample of 260 participants was deemed necessary.

### Procedure

Study-independent trained clinical psychologists collected data by performing personal interviews with the participants that required approximately 60 min. Completed questionnaires were collected back by the interviewer and sent for data entry. During the data collection process, the anonymity of the participants was guaranteed.

The full sample was randomly divided into two separate samples (406 for the first sample and 405 for the second sample). To ensure the validity of the results from sample 1, the score of the EAT scale used in sample 1 was tested on another sample (sample 2).

### Questionnaire

The questionnaire used during the interview was in Arabic, the native language of Lebanon. The first part assessed the socio-demographic details of the participants. The BMI was

calculated as follows: weight (kg) divided by the square of the height (metres), as self-reported by each participant. Consumption of alcohol, caffeinated beverages and tobacco was categorised into dichotomous variables (yes/no). The physical activity index is a frequently used indicator of physical activity at the population level. This index is based on responses to a series of questions about the intensity, frequency and duration of participation in physical activity during leisure time. The Total Physical Activity Index was calculated by multiplying the intensity, duration and frequency of daily activity[38]. The education level was categorised into four groups: primary, complementary, secondary and university; however, when stratifying over education, the four groups were reduced to two, low level of education (illiterate, primary and complementary) and high level of education (secondary, university).

The second part of the questionnaire consisted of the perception of eating habits among participants. The questions were selected from previous articles about eating disorders[39–41]. The final part included the following scales.

### Eating Attitude Test

The EAT is used to assess disordered food attitude[42]. The questionnaire comprises twenty-six questions each with six response options, varying from infrequently/almost never/never (0) to always (3). The total score is calculated by summing all questions answers and can vary from 0 to 78. A score of 20 or above indicates possible disordered food attitudes[43]. In the current study, the Cronbach's $\alpha$ was 0·908.

### Body dissatisfaction subscale of the Eating Disorder Inventory second version

In the present study, body dissatisfaction subscale of Eating Disorder Inventory second version was used to measure body disturbance. The body dissatisfaction subscale contains nine items assessing levels of dissatisfaction with their overall body shape as well as specific body parts. A four-point Likert scale was used ranging from 0 (sometimes, rarely and never) to 3 (always). Higher scores indicate more body dissatisfaction[44]. In the current study, the Cronbach's $\alpha$ was 0·779.

### Perceived Stress Scale

The questions in the Perceived Stress Scale ask about feelings and thoughts during the last month[45]. The Perceived Stress Scale is a ten-item scale, with answers ranging from never (0) to almost always (4). Items 4, 5, 7 and 8 are reversed items. The total score is calculated by summing the ten items with higher scores indicating more perceived stress[45]. In the current study, the Cronbach's $\alpha$ was 0·709.

### Hamilton Anxiety Rating Scale

The Hamilton Anxiety Rating Scale, validated in Lebanon[46], consists of fourteen symptom-defined elements and targets both psychological and somatic symptoms. Each item is scored on a basic numeric scoring of 0 (not present) to 4 (severe). The total score ranging from 0 to 56, with higher scores indicating higher anxiety[47]. In the current study, the Cronbach's $\alpha$ was 0·912.

### Hamilton Depression Rating Scale

The Hamilton Scale for Depression, validated in Lebanon[48], is used to evaluate the severity of depression in patients who are already diagnosed as depressed. The total score is based on the sum of the first seventeen items only. Higher scores indicated higher depression[49]. In the current study, the Cronbach's $\alpha$ was 0·879.

### Emotion Regulation Questionnaire (ERQ)

The Emotion Regulation Questionnaire is used to measure respondents' tendency to regulate their emotions in two ways: (1) cognitive reappraisal and (2) expressive suppression. The cognitive reappraisal facet is a way of managing and controlling attention and cognitively changing the meaning of emotionally stimulating stimuli[50]. It is considered a healthy emotion regulation strategy[50]. The expressive suppression involves inhibition of emotional expressive behavior, thereby changing the emotional impact of a situation[51]. It is considered a less healthy emotion regulation strategy[51]. A ten-item scale ranging from 1 (strongly disagree) to 7 (strongly agree). Items 1, 3, 5, 7, 8 and 10 make up the cognitive reappraisal facet and items 2, 4, 6 and 9 make up the expressive suppression facet. Each facet's scoring is kept separate. The higher the scores, the greater the use of the emotion regulation strategy[52]. In the current study, the Cronbach's $\alpha$ values for the cognitive reappraisal facet and the expressive suppression facet were 0·744 and 0·732, respectively.

The emotional eating, restrained eating, orthorexia nervosa and binge eating scales were used to test the convergent validity of the EAT scale.

### Emotional Eating Scale

The Emotional Eating Scale, validated in Lebanon[53] is a twenty-five-item scale with three-factor analytically derived subscales: anger, anxiety and depression. Participants rate the extent to which certain feelings lead to the urge to eat using a five-point Likert scale ranging from 0 (no desire to eat) to 4 (an overwhelming urge to eat). Higher scores indicate a reliance on using food to help managing emotions[54]. In the current study, the Cronbach's $\alpha$ was 0·957.

### Dutch Restrained Eating Scale

Recently, Dutch Restrained Eating Scale, validated in Lebanon[55], is composed of ten items scored using a five-point Likert scale, varying from 1 (never) to 5 (always). By dividing the total items score by the total number of items, the score for this scale was acquired. A greater score would show higher degree of restrained eating[56] (Cronbach's $\alpha = 0·928$).

### Orthorexia Nervosa Scale – ORTO-15

The Orthorexia Nervosa Scale, validated in Lebanon[57], is a measure instrument comprising fifteen multiple-choice items. Orthorexia Nervosa Scale is a self-reported questionnaire[58] with a four-point Likert scale (never, sometimes, often and always). Lower scores would indicate higher levels of orthorexia tendencies and behaviours. In the current study, the Cronbach's $\alpha$ was 0·822.

### Binge Eating Scale

The Binge Eating Scale, validated in Lebanon[59], was originally developed to identify binge eaters within an obese population[60]. It does not specify a time frame and presents a series of differently weighted statements for each item, from which respondents select the statement that best describes their attitudes and behaviours. This yields a continuous measure of binge eating pathology of 0–46. The severity of binge eating was divided into three categories as follows: < 17 as non-binging, between 18 and 26 as moderate binging and $\geq$ 27 as severe binging[61]. The Binge Eating Scale has good test–retest reliability ($r = 0·87$, $P < 0·001$). In the current study, the Cronbach's $\alpha$ was 0·862.

### Forward and back translation procedure

Forward translation was first conducted by a single bilingual translator, whose native language is Arabic and fluent in English. An expert committee formed by healthcare professionals and a language professional verified the Arabic-translated version. A backward translation was then performed by a native English speaker translator, fluent in Arabic and unfamiliar with the concepts of the scales. The back-translated English questionnaire was subsequently compared with the original English one, by the expert committee, aiming to discern discrepancies and to solve any inconsistencies between the two versions. The process of forward-back translation was repeated until all ambiguities disappeared.

### Statistical analysis

SPSS software version 25 was used to conduct data analysis. A descriptive analysis was done using the counts and percentages for categorical variables and mean and SD for continuous measures. We checked the distribution normality for the EAT scale using the Shapiro Wilk test. Since the assumption of normality was not normally distributed, the comparison of means was performed using the non-parametric tests (Kruskal–Wallis and Mann–Whitney tests). Spearman correlation was used for the linear correlation between continuous variables. For categorical variables, the $\chi^2$ and Fisher exact tests were used.

A stepwise linear regression was conducted, taking the EAT score as the dependent variable. All variables that showed a $P < 0·1$ in the bivariate analysis were considered important variables to be entered in the model in order to eliminate potentially confounding factors as much as possible. Afterwards, other stepwise linear regressions taking the EAT as the dependent variable but stratified over education level were conducted (stratification analysis).

Two different methods were used to confirm the EAT questionnaire construct validity. First, a factor analysis was run using the principal component analysis technique, run on sample 1. Since the extracted factors were found to be significantly correlated, the promax rotation technique was used. To ensure the model's adequacy, the Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett's test of sphericity were calculated. Factors with an eigenvalue higher than one were retained. Moreover, Cronbach's $\alpha$ was recorded for reliability analysis for each scale.

Second, a confirmatory factor analysis was carried out in sample 2. To assess the structure of the instrument, the maximum likelihood method for discrepancy function was used. Several goodness-of-fit indicators were reported: relative chi-square ($\chi^2$/df), root mean square error of approximation, goodness of fit index and the adjusted goodness of fit index. The goodness of fit index was calculated by the value of $\chi^2$/df (cut-off values <2–5). The root mean square error of approximation tests the fit of the model to the covariance matrix. As a guideline, values of <0·05 indicate a close fit and values below 0·11 an acceptable fit. The goodness of fit index and adjusted goodness of fit index are $\chi^2$-based calculations independent of df. The recommended thresholds for acceptable values are $\geq 0·90$[62]. A $P < 0·05$ was considered significant.

## Results

Out of 1000 questionnaires distributed, 811 (81·1 %) were completed and collected. The socio-demographic characteristics of the participants in the first sample are summarised in Table 1. The results from sample 1 showed that disordered eating attitudes was found in 95 (23·8 %) (95 % CI 0·152–0·323) participants, whereas 305 (76·2 %) participants had appropriate eating attitudes (95 % CI 0·715–0·810). No significant difference was found between samples 1 and 2 for all the variables (socio-demographic variables, smoking, alcohol and carbonated beverages intake, and physical activity).

### Exploratory factor analysis on sample 1

Out of all the items of EAT-26 scale, none of the items was removed since no one over-correlated to each other ($r > 0·9$), or had a low loading on factors (<0·3) or even had a low communality (<0·3). The factor analysis for the EAT scale was run over half of the original sample (total $n$ 403). The EAT-26 scale items converged over a solution of six factors that had an eigenvalue over 1 (factor 1 = restrained eating attitude, factor 2 = anorexic attitude,

**Table 1** Socio-demographic characteristics of the study sample

| | Total | | Sample 1 | | Sample 2 | | |
|---|---|---|---|---|---|---|---|
| | Frequency (%) | | Frequency (%) | | Frequency (%) | | |
| | *n* | % | *n* | % | *n* | % | *P* |
| Gender | | | | | | | |
| Male | 270 | 33·5 | 131 | 3·4 | 139 | 34·6 | 0·518 |
| Female | 536 | 66·5 | 273 | 67·6 | 263 | 65·4 | |
| Marital status | | | | | | | |
| Single | 533 | 67·0 | 263 | 66·1 | 270 | 67·8 | 0·395 |
| Married | 230 | 28·9 | 120 | 30·2 | 110 | 27·6 | |
| Widowed | 11 | 1·4 | 7 | 1·8 | 4 | 1·0 | |
| Divorced | 22 | 2·8 | 8 | 2·0 | 14 | 3·5 | |
| Education level | | | | | | | |
| Primary | 24 | 3·1 | 11 | 2·8 | 13 | 3·3 | 0·760 |
| Complementary | 61 | 7·8 | 34 | 8·7 | 27 | 6·9 | |
| Secondary | 125 | 15·9 | 60 | 15·3 | 65 | 16·6 | |
| University | 574 | 73·2 | 288 | 73·3 | 286 | 73·1 | |
| Monthly income | | | | | | | |
| No income | 340 | 45·1 | 168 | 44·4 | 172 | 45·7 | 0·140 |
| <1000 USD | 247 | 32·8 | 121 | 32·0 | 126 | 33·5 | |
| 1000–2000 USD | 117 | 15·5 | 56 | 14·8 | 61 | 16·2 | |
| >2000 USD | 50 | 6·6 | 33 | 8·37 | 17 | 4·5 | |
| Smoking | | | | | | | |
| Yes | 246 | 30·8 | 127 | 31·7 | 119 | 29·8 | 0·572 |
| No | 554 | 69·2 | 274 | 68·3 | 280 | 70·2 | |
| Alcohol | | | | | | | |
| Yes | 32 | 4·2 | 12 | 3·1 | 20 | 5·4 | 0·124 |
| No | 724 | 95·8 | 372 | 96·9 | 352 | 94·6 | |
| Caffeinated beverages | | | | | | | |
| Yes | 721 | 90·0 | 362 | 90·5 | 359 | 89·5 | 0·646 |
| No | 80 | 10·0 | 38 | 9·5 | 42 | 10·5 | |
| Practicing sport activities | | | | | | | |
| Yes | 490 | 62·4 | 248 | 63·6 | 242 | 61·3 | 0·501 |
| No | 295 | 37·6 | 142 | 36·4 | 153 | 38·7 | |
| Age (in years) | | | | | | | 0·354 |
| Mean | 27·59 | | 27·96 | | 27·19 | | |
| SD | 11·76 | | 11·83 | | 11·68 | | |
| BMI (kg/m²) | | | | | | | 0·182 |
| Mean | 24·35 | | 24·10 | | 24·60 | | |
| SD | 5·28 | | 4·98 | | 5·55 | | |

The $\chi^2$ and Fisher exact tests were used to evaluate the association between categorical variables, and the Mann–Whitney test was used to evaluate the association between the age, body mass index (BMI) and the sample group.

factors 3 and 4 = cycle of bulimic crises, factor 5 = impact of others' perception and factor 6 = choice of food quality and time spent on meals; total variance explained = 60·07 %, Kaiser-Meyer-Olkin = 0·911, Bartlett's test of sphericity $P < 0.001$ and Cronbach's $\alpha = 0.895$) According to the promax rotated matrix, the components are summarised in Table 2.

Another factor analysis was run by forcing a rotation over a three-factor solution instead of six; three items (2, 18 and 26) were removed, leaving a total of 23 items (total variance explained = 48·73 %, Kaiser–Meyer–Olkin = 0·904, Bartlett's test of sphericity $P < 0.001$). According to the promax rotated matrix, the components are summarised in Table 3.

### Confirmatory factor analysis on sample 2

A confirmatory factor analysis was run on sample 2, using the structure obtained in sample 1. The following results

were obtained: the maximum likelihood $\chi^2 = 723$ and df = 300, which gave a $\chi^2/\text{df} = 2.4$. For non-centrality fit indices, the Steiger–Lind root mean square error of approximation was 0·13 (0·131–0·142). Moreover, the Joreskog goodness of fit index equaled 0·767 and adjusted goodness of fit index equaled 0·711.

### Bivariate analysis conducted on the whole sample

A significantly higher mean of EAT score was found in participants following a diet (18·85 *v.* 11·66, $P < 0.001$), exercising (16·66 *v.* 12·06, $P < 0.001$), vomiting (25·83 *v.* 12·49, $P < 0.001$), taking diet pills (23·43 *v.* 12·74, $P < 0.001$), starving to lose weight (21·26 *v.* 11·84, $P < 0.001$) in the last 30 d and weighing daily (20·09 *v.* 12·49, $P = 0.005$) compared with those who do not follow these eating habits. Also, a significantly higher mean of EAT score was found in participants who received comments from their family members about losing weight (16·75 *v.* 12·48, $P < 0.001$), those who

**Table 2** Promax rotated matrix of the eating attitude eating scale items

| Items | Factor loading | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Factor 1: restrained eating attitude ($\alpha = 0.785$) | | | | | | |
| 6. Aware of the energy content of foods that I eat | 0.852 | | | | | |
| 16. Avoid foods with sugar in them | 0.790 | | | | | |
| 17. Eat diet foods | 0.742 | | | | | |
| 7. Particularly avoid food with a high carbohydrate content (i.e., bread, rice, potatoes, etc.) | 0.734 | | | | | |
| 5. Cut my food into small pieces | 0.516 | | | | | |
| 19. Display self-control around food | 0.405 | | | | | |
| Factor 2: anorexic attitude ($\alpha = 0.811$) | | | | | | |
| 11. Am preoccupied with a desire to be thinner | | 0.831 | | | | |
| 12. Think about burning up energies when I exercise | | 0.797 | | | | |
| 1. Am terrified about being overweight | | 0.733 | | | | |
| 14. Am preoccupied with the thought of having fat on my body | | 0.719 | | | | |
| 10. Feel extremely guilty after eating | | 0.489 | | | | |
| 2. Avoid eating when I am hungry | | 0.434 | | | | |
| Factors 3 and 4: cycle of bulimic crises ($\alpha = 0.710$ and $0.807$) | | | | | | |
| 3. Find myself preoccupied with food | | | 0.852 | | | |
| 4. Have gone on eating binges where I feel that I may not be able to stop | | | 0.843 | | | |
| 9. Vomit after I have eaten | | | 0.482 | | | |
| 18. Feel that food controls my life | | | 0.478 | | | |
| 21. Give too much time and thought to food | | | | 0.721 | | |
| 22. Feel uncomfortable after eating sweets | | | | 0.684 | | |
| 24. Like my stomach to be empty | | | | 0.609 | | |
| 23. Engage in dieting behaviour. | | | | 0.589 | | |
| 25. Have the impulse to vomit after meals | | | | 0.491 | | |
| Factor 5: impact of others' perception ($\alpha = 0.734$) | | | | | | |
| 13. Other people think that I am too thin | | | | | 0.837 | |
| 8. Feel that others would prefer if I ate more | | | | | 0.819 | |
| 20. Feel that others pressure me to eat | | | | | 0.709 | |
| Factor 6: choice of food quality and time spent on meals ($\alpha = 0.432$) | | | | | | |
| 26. Enjoy trying new rich foods | | | | | | 0.611 |
| 15. Take longer than others to eat my meals | | | | | | 0.479 |
| Percentage of variances explained | 32.06 | 7.41 | 6.73 | 5.28 | 4.39 | 4.20 |

have been insulted (21·84 v. 12·79, $P < 0.001$), those who have been in a bad relationship (15·35 v. 13·16, $P = 0.027$), had a family history of eating disorders (17·18 v. 12·82, $P = 0.001$) and felt pressure from media to lose weight (19·68 v. 12·45, $P < 0.001$) compared with those who do not agree with these statements.

In addition, a higher body dissatisfaction ($r = 0.135$), higher restrained eating ($r = 0.229$), higher anxiety ($r = 0.285$), higher depression ($r = 0.302$), higher physical activity ($r = 0.092$), higher binge eating ($r = 0.277$) and higher emotional eating ($r = 0.143$) were significantly but weakly associated with higher EAT scores. However, higher orthorexia scores (lower orthorexia tendencies and behaviours) ($r = -0.256$) were significantly associated with lower EAT scores (more appropriate eating) (Tables 4 and 5).

### Multivariable analysis conducted on the whole sample

The results of a first linear regression, taking the EAT score as the dependent variable and the socio-demographic characteristics only as independent variables, showed that secondary ($\beta = -5.87$) and university level of education ($\beta = -5.26$) were significantly associated with lower EAT score (appropriate eating attitudes) (Table 6, model 1).

The results of a second stepwise linear regression, considering the EAT score as the dependent variable and the scales and the opinion about eating habits as independent variables, showed that higher depression ($\beta = 0.325$), higher emotional eating ($\beta = 0.083$), daily weighing ($\beta = 3.430$), higher physical activity (0.05), starving to reduce weight ($\beta = 4.94$) and receiving pressure from TV/magazine to lose weight ($\beta = 3.95$) were significantly associated with higher EAT scores (disordered eating attitudes) (Table 6, model 2).

### Stratification over education level conducted on the whole sample

A first linear regression, taking the EAT-26 as the dependent variable and the socio-demographic characteristics as independent variables, stratified over education level, showed that low income ($\beta = 11.21$) was significantly associated with higher EAT-26 scores (disordered eating attitudes) in the low-educated group. Higher BMI ($\beta = 0.24$) and intermediate income ($\beta = 3.86$) were significantly associated with higher EAT-26 scores (disordered eating

**Table 3** Promax rotated matrix of the eating attitude eating scale items using a forced three-factor solution

| | Factor loading | | |
|---|---|---|---|
| Items | 1 | 2 | 3 |
| Factor 1: restrained eating attitude ($\alpha = 0.852$) | | | |
| 14. Am preoccupied with the thought of having fat on my body | 0.789 | | |
| 11. Am preoccupied with a desire to be thinner | 0.748 | | |
| 12. Think about burning up energies when I exercise | 0.675 | | |
| 17. Eat diet foods | 0.646 | | |
| 24. Like my stomach to be empty | 0.607 | | |
| 1. Am terrified about being overweight | 0.603 | | |
| 23. Engage in dieting behaviour | 0.585 | | |
| 16. Avoid foods with sugar in them | 0.541 | | |
| 22. Feel uncomfortable after eating sweets | 0.495 | | |
| 6. Aware of the energy content of foods that I eat | 0.438 | | |
| 2. Avoid eating when I am hungry | 0.417 | | |
| Factor 2: anorexic attitude ($\alpha = 0.785$) | | | |
| 4. Have gone on eating binges where I feel that I may not be able to stop | | 0.783 | |
| 3. Find myself preoccupied with food | | 0.706 | |
| 9. Vomit after I have eaten | | 0.676 | |
| 25. Have the impulse to vomit after meals | | 0.676 | |
| 21. Give too much time and thought to food | | 0.587 | |
| 10. Feel extremely guilty after eating | | 0.530 | |
| Factors 3 ($\alpha = 0.742$) | | | |
| 8. Feel that others would prefer if I ate more | | | 0.734 |
| 13. Other people think that I am too thin | | | 0.720 |
| 20. Feel that others pressure me to eat | | | 0.588 |
| 15. Take longer than others to eat my meals | | | 0.525 |
| 19. Display self-control around food | | | 0.523 |
| 5. Cut my food into small pieces | | | 0.489 |
| Percentage of variances explained | 32.68 | 8.27 | 7.70 |

**Table 4** Spearman correlation between Eating Attitude Test (EAT) and other scales

| | EAT score | |
|---|---|---|
| | Correlation coefficient | *P* |
| Body dissatisfaction score | 0.135 | **<0.001** |
| Restrained Eating Scale | 0.229 | **<0.001** |
| Perceived Stress Scale | 0.068 | 0.055 |
| Anxiety | 0.285 | **<0.001** |
| Depression | 0.302 | **<0.001** |
| Emotion regulation cognitive reappraisal facet | −0.044 | 0.239 |
| Emotion regulation expression suppression facet | 0.042 | 0.271 |
| Emotional eating | 0.143 | **<0.001** |
| Orthorexia nervosa | −0.256 | **<0.001** |
| Binge eating scale | 0.277 | **<0.001** |
| Physical activity index | 0.092 | **0.035** |

Numbers in bold indicate significant *P*-values. Pearson correlation coefficient was used to evaluate the association between the EAT score and the continuous variables.

attitudes), whereas increase age ($\beta = -0.11$) was significantly associated with lower EAT-26 scores (appropriate eating attitudes) in the high-educated group.

A second linear regression analysis taking the EAT-26 as the dependent variable and the scales and the opinion about eating habits as independent variables, stratified over education level, showed that starving to reduce weight ($\beta = 14.00$) was significantly associated with higher EAT-26 scores (disordered eating attitudes) in the low-educated group. Daily weighting ($\beta = 3.17$), higher depression

($\beta = 0.30$), receiving pressure from the TV/magazine to lose weight ($\beta = 4.24$) and physical activity ($\beta = 0.07$) were significantly associated with higher EAT scores (disordered eating attitudes) in the high-educated group (Table 7).

## Discussion

To the best of our knowledge, this is the first study to assess factors associated with the eating attitude among a

**Table 5** Bivariate analysis of the factors associated with the Eating Attitude Test (EAT) score

| | | EAT score | | |
| --- | --- | --- | --- | --- |
| | | Mean | SD | P |
| Education level | Primary | 13·29 | 12·38 | 0·169 |
| | Complementary | 16·73 | 15·93 | |
| | Secondary | 12·23 | 11·19 | |
| | University | 13·39 | 12·20 | |
| Monthly income | No income | 13·06 | 11·53 | 0·402 |
| | <1000 USD | 13·37 | 13·31 | |
| | 1000–2000 USD | 15·74 | 14·71 | |
| | >2000 USD | 11·71 | 10·77 | |
| Dieted to lose weight (past 30 d) | No | 11·66 | 11·44 | <**0·001** |
| | Yes | 18·85 | 14·43 | |
| Exercised to lose weight (past 30 d) | No | 12·06 | 12·03 | <**0·001** |
| | Yes | 16·66 | 13·59 | |
| Vomited or taken laxatives to lose weight (past 30 d) | No | 12·49 | 11·84 | <**0·001** |
| | Yes | 25·83 | 15·23 | |
| Taken diet pills to lose weight (past 30 d) | No | 12·74 | 11·99 | <**0·001** |
| | Yes | 23·43 | 15·39 | |
| Starving to lose weight (past 30 d) | No | 11·84 | 11·28 | <**0·001** |
| | Yes | 21·26 | 15·36 | |
| Daily weighting | No | 12·44 | 11·46 | <**0·001** |
| | Yes | 20·09 | 16·37 | |
| Receiving comments from the family concerning losing weight | No | 12·48 | 12·20 | <**0·001** |
| | Yes | 16·75 | 13·68 | |
| Being insulted because of weight | No | 12·79 | 11·78 | <**0·001** |
| | Yes | 21·84 | 17·92 | |
| | Yes | 24·35 | 17·16 | |
| Being in a bad romantic relationship | No | 13·16 | 12·45 | **0·027** |
| | Yes | 15·35 | 13·56 | |
| Family history of eating disorders | No | 12·82 | 12·03 | **0·001** |
| | Yes | 17·18 | 14·81 | |
| Pressure from TV, magazine to lose weight | No | 12·45 | 12·05 | <**0·001** |
| | Yes | 19·68 | 14·52 | |

Numbers in bold indicate significant P-values; the Mann–Whitney test was used to evaluate the association between the EAT score and dichotomous variables, whereas the Kruskal–Wallis test was used to evaluate the association between the EAT score and the categorical variables.

**Table 6** Multivariable analysis

| | Unstandardised $\beta$ | Standardised $\beta$ | P | CI Lower Bound | Upper Bound |
| --- | --- | --- | --- | --- | --- |
| **Model 1: Linear regression taking the Eating Attitude Test score as the dependent variable and the socio-demographic characteristics only as the independent variables*** | | | | | |
| Secondary level of education compared to illiteracy* | −5·878 | −0·167 | 0·007 | −10·182 | −1·575 |
| University level of education compared to illiteracy* | −5·266 | −0·187 | 0·009 | −9·218 | −1·314 |
| **Model 2: Linear regression taking the Eating Attitude Test score as the dependent variable and the scales and the behavioural practices of certain eating habits as independent variables†** | | | | | |
| Depression | 0·325 | 0·191 | <0·001 | 0·188 | 0·462 |
| Emotional eating | 0·083 | 0·123 | 0·003 | 0·028 | 0·137 |
| Daily weighing (yes v no*) | 3·430 | 0·104 | 0·013 | 0·726 | 6·134 |
| Physical activity index | 0·054 | 0·095 | 0·016 | 0·010 | 0·098 |
| Starving to reduce weight (yes v no*) | 4·942 | 0·155 | <0·001 | 2·258 | 7·625 |
| Feeling pressure from TV/magazine to lose weight (yes v no*) | 3·955 | 0·115 | 0·006 | 1·151 | 6·759 |

*Reference group; Variables entered in model 1: age, BMI, gender, marital status, monthly income and education level.
†Variables entered in model 2: age, BMI, gender, marital status, monthly income, education level, body dissatisfaction, anxiety, depression, emotional eating, binge eating, physical activity index, dieted to lose weight, exercised to lose weight, vomited or taken laxatives to lose weight, taken diet pills to lose weight, starving to lose weight, daily weighting, receiving comments from the family concerning losing weight, being insulted, being physically abused, being sexually abused, being in a bad romantic relationship, family history of eating disorders, pressure from TV, magazine to lose weight. Nagelkerke $R^2 = 26.5$ %.

representative Lebanese population sample. Our results showed that 23·8 % of participants had disordered eating attitudes, whereas 76·2 % had appropriate eating attitudes and are in line with other studies: a study carried out among young women from Brazil (2003) showed a clinically significant disturbed eating behaviour in 16·5 % of women, with more disordered eating attitudes among those aged 16–19 years and among overweight/obese women[63]. The

**Table 7** Stratification over the education level*

|  | Low education level (below 12 years of education) | | | High education level (over 12 years of education) | | |
|---|---|---|---|---|---|---|
|  | $\beta$ | 95 % CI | P | $\beta$ | 95 % CI | P |
| Model 1: Linear regression taking the Eating Attitude Test score as the dependent variable and the socio-demographic characteristics as the independent variables | | | | | | |
| Age | 0·18 | −0·09, 0·46 | 0·186 | −0·11 | −0·20, 0·02 | **0·009** |
| Body mass index | 0·25 | −0·22, 0·73 | 0·295 | 0·24 | 0·04, 0·43 | **0·016** |
| Low income *v* no income* | 11·21 | 3·35, 19·07 | 0·006 | −1·87 | −4·02, 0·27 | 0·087 |
| Intermediate income *v* no income* | −3·39 | −14·29, 7·50 | 0·537 | 3·86 | 1·20, 6·53 | **0·005** |
| Model 2: Linear regression taking the Eating Attitude Test score as the dependent variable and the scales and the behavioural practices of certain eating habits as independent variables | | | | | | |
| Daily weighting (yes *v* no*) | 10·30 | −5·84, 26·46 | 0·194 | 3·17 | 0·41, 5·93 | **0·024** |
| Pressure from TV, magazine to lose weight (yes *v* no*) | −0·10 | −12·00, 11·80 | 0·986 | 4·24 | 1·37, 7·11 | **0·004** |
| Starving to reduce weight (yes *v* no*) | 14·00 | 4·76, 23·24 | 0·004 | 3·65 | 0·82, 6·48 | **0·012** |
| Depression (HAMD) | 0·88 | −0·29, 2·05 | 0·130 | 0·30 | 0·14, 0·45 | **<0·001** |
| Physical activity | 0·04 | −0·27, 0·36 | 0·764 | 0·07 | 0·03, 0·12 | **0·001** |

*Reference group; Low education level includes illiterate, primary and complementary categories, whereas the high education level includes the secondary and university categories; numbers in bold indicate significant *P*-values.

prevalence of disorder eating attitudes in western countries varies from 0·4 % in Spain[64] to 33 % in Australia[65].

In our study, EAT scale items converged over a solution of six factors explaining a total of 60·07 % of the variance and leading to an internal consistency of Cronbach's $\alpha = 0.895$. The validation of the EAT in Mexico showed five factors (constituting a total of 46·6 % of the variance): 'dietary restraint', 'bulimia', 'drive of thinness', 'food preoccupation and perceived social pressure' and with an internal consistency of Cronbach's $\alpha = 0.9$[66]. The Spanish validation in its turn yielded three factors explaining 41 % of the variance, with a reliability coefficient of 0·93[30]. This test was also validated in Italy and consisted of four phases: 'Item generation, internal consistency and reliability analysis, normative data generation, and validity analysis', with an internal consistency Cronbach's $\alpha$ values of 0·90 and 0·93[67]. Thereby, Cronbach's $\alpha$ values show a very small variation between different countries: this is due to the fact that the Cronbach's $\alpha$ is not a characteristic for the whole test but for the sample took in the test; it might vary if the test is done on a general population or a sample composed of people having a specific characteristic, for example. However, these obtained values were almost similar, meaning these populations share very close eating attitudes.

Receiving pressure from TV or magazines to lose weight, starving to reduce weight (in the past 30 d), higher depression and higher physical activity were associated with higher EAT scores (disordered eating attitudes) in the better educated group. Previous studies revealed that physical activity levels explained the relationship between prudent dietary patterns, depressive symptoms[68] and severity of anxiety symptoms[69]; specifically, lower scores of the healthy dietary pattern and higher scores of the unhealthy dietary pattern independently predicted increased

depressive symptoms across time without establishing any correlation with educational level. Furthermore, social media exposure was associated with eating pathology, independent of direct media exposure and other cultural exposures. The different variables explored were not directly correlated with the level of education in the literature. Thus, our findings, related to the stratification by level of education, warrant further investigation to better understand the relation between the level of education and the different variables associated at the same time with the score of EAT.

In the current study, higher depression levels were found to be significantly associated with more disordered eating attitudes (higher EAT scores), similarly to other studies[17,19,70], knowing that depression is often due to an anxiety feeling over a long period of time[71]. These unwanted feelings are usually accompanied by an intensified need for eating high-sugar food or high-fat food as a self-medication[17]. This might be attributed to a greater body concern of women nowadays for having an ideal social media body to look 'beautiful and attractive'[6]. In fact, the desire to become similar to TV characters increased the anxiety and depression among women[19], and these unpleasant feelings resulted sometimes in excessive eating[72]. Clearly, peer pressure and social media stars have a bad influence on individuals, especially women, to the point where body image dissatisfaction became a 'normative discontent'[16]. Studies show that a higher frequency of social media use, especially the image-centric platforms, resulted in greater body dissatisfaction concern[6]. Effectively, these social media platforms tend to promote disordered eating behaviours by always encouraging the 'thin ideal' leading to disastrous weight loss tendencies[7], fasting, higher depression, daily weighing, etc.

Therefore, people are tending to adapt starving methods such as fasting, purging, chronic dieting[19] or the daily

weighing method, thinking that it would help them lose weight. Although daily weighting might help them manage their weight by always keeping an eye on it[73], starvation for example, will lead to even more weight gain, because our body does not recognise the difference between this procedure and dieting.

In return, emotional eating was proven to be strongly related to disordered eating attitudes, which is consistent with the results of other studies[15]. Many factors were evaluated in the literature to highlight the effect of emotions on eating attitudes. Individuals suffering from a lack of attention from parents or friends[74], and sexual and emotional abuse, showed higher levels of eating disorders, due to the compensation of affection in food, and for those people, food is known to be their 'comfort zone'. Nowadays, people are exposed to numerous criticisms which creates among adolescents a huge personal irritation and a lower self-esteem, making it a crucial cause for restrained eating, followed by binge eating or over eating.

High education level had been found to be related with appropriate eating attitudes; thus, a stratification by level of education was found to be important. A low education level was related to unhealthy dietary habits: low-educated people tend to consume dense food, whereas high-educated people have more positive attitudes in choosing foods as they acquire adequate health information that improves ability in choosing the right foods. A study conducted in 2013[75] revealed that more educated people were more compliant with dietary guidelines and expressed more frequently positive attitudes towards healthy eating than low-educated people. Our results showed that low income was associated with higher disordered eating behaviour among low-educated groups. Less educated and low-income people have less healthy dietary habits, in part because of their higher priority for price and familiarity and their lower priority for health as a reason for buying food. A Finnish study showed that the level of education is related to individual priorities in the choice of food, where the more educated consume fewer energy-rich foods than those with less education[76]. However, the association between the level of education and eating attitudes is not fully understood, and further studies are needed to investigate the attitudes and motives for making food choices.

### Clinical implications

Healthcare professionals and dietitians should take into consideration the factors affecting a person's eating attitude before prescribing a diet plan. Reasons differ from one person to another, as for some, eating disorders are a response to a major impact that affected their lives (early separation, stress, depression, anxiety, etc.), while for others, a non-balanced diet occurs following a low self-esteem and a self-objectification, due to the major influence of social media and TV programmes. Therefore, healthcare professionals should not only be responsible for prescribing trendy diet plans but also change their approach with patients and understand the reasons behind such disordered attitudes towards eating, then adapt the diet plan accordingly.

### Limitations

An information bias might have occurred during the data collection since it was based on a self-report questionnaire. Our data could not be generalised to the entire population, since the group of well-educated female participants was more represented; this led us to conduct the stratified analysis and show differential results between high- v. low-educated subgroups. We would assume some kind of self-selection bias: maybe from each randomly selected household, younger and more educated individuals (e.g., students) participated in the study more often than older and less educated individuals. One additional limitation is the absence of an evaluation tool for obsessive-compulsive disorder and anorexic behaviours. It will be interesting to evaluate these behaviours among persons with disordered eating attitudes.

### Conclusion

The current study found a high prevalence of disordered eating attitudes in the Lebanese population. Yet, the obtained results are considered preliminary, and further research should be conducted to prove it. Disordered eating attitudes and disorders will remain a controversial issue with respect to their relationship with psychological health and mental disorders. Future studies should point out at the importance of raising the awareness about social media, peer pressure and psychological influence on eating attitudes, since these are the main causes of eating disorders nowadays.

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