Original Research Article

Body Image Dissatisfaction and Psychological Distress among Adults with Excessive Body Weight

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ABSTRACT

Excessive body weight among adult population has emerged as a major public health concern in both developed and developing countries. This study examined the effects of actual body weight and body image dissatisfaction on psychological distress among adults with excessive body weight. A cross sectional study was conducted using a convenient sample of adults aged 18 to 40 years old with a body mass index higher than 25 Kg/m^2. Participants were recruited from different institutions in Lebanon. Data was collected using a self-administered questionnaire including information about socio-demographic characteristics, cigarette smoking, weight and height measurements, and three standardized questionnaires namely the Beirut Distress Scale, the Body Shape Questionnaire, and the Eating Attitude Test. The total number of participants was 200 of which 66.5 % were females with a mean age of 26.9 years. Multiple linear regression analysis showed that body shape dissatisfaction was associated with Psychological Distress in the overall sample (Standardized Beta= 0.40). The moderating effect of gender and body mass index categories was tested in the adjusted models using interaction terms. The association between body shape dissatisfaction and psychological distressdiffered by gender only (P-value for interaction=0.006). The positive relationship between body shape dissatisfaction and psychological distress was more pronounced among men (Standardized Beta= 0.59) than women (Standardized Beta= 0.28). However, no significant effect for body mass index on psychological distress was found. Body image dissatisfaction rather than excessive body weight per se is associated with greater risk for psychological distress.

Keywords: Body Image Dissatisfaction; Psychological Distress; Body Mass Index; Excessive body weight; Adults.

INTRODUCTION

Excessive body weight among adult population has emerged as a major public health concern in both developed and developing countries. [1] Taking body mass index (BMI) as indicator of body fat, recent published data indicate around 65% of the Lebanese adult population as overweight (BMI$\geq$25 Kg/m^2) while28.2% are considered obese (BMI $\geq$ 30 Kg/m^2). [2]
Excessive body weight has been linked to a set of chronic medical diseases, including type II diabetes, cardiovascular disease, hypertension, dyslipidemia, stroke,

respiratory problems, osteoarthritis, and certain forms of cancer (endometrial, breast, and colon). [3] The aftereffect of this obesity related association is premature mortality. [4] Quite opposite to the strong evidence linking excess body fat and detrimental physical health, common beliefs implicating excessive weight as a contributing factor in the development of psychological distress (PD) have not been well supported by research due to contradictory results. Whilst no or negative association existed in some population-based research, [5] a positive relationship between excessive body weight and PD was reported in others. [6] A closer review of the published literature on the association between excess weight and PD underscores the fact that other factors rather than the overweight status per se may be causally related to PD or mediates the association between these two concepts. [7] Identification of such factors is crucial and may partly explain why discrepancies exist in the published literature. One of these factors is negative body image particularly body shape dissatisfaction. [7,8] In fact, overweight and obese individuals are particularly susceptible to holding a negative body image and experiencing greater body dissatisfaction which in turn may lead to PD. [8]

In general, few studies have been done on body image that may account for the conflicting evidence for a relationship between excessive weight and its negative psychological correlates. Thus, the purpose of this study is to examine the effects of actual body weight and body image, particularly body shape dissatisfaction on PD among overweight and obese adults. This type of study permits delineating potential effects of weight status and body image on PD and could identify a unique subgroup of individuals at increased risk of psychological morbidity.

MATERIALS AND METHODS

This was a cross sectional study that recruited conducted over the period extending from June to September 2015.

Participants were recruited through convenience sampling at different institutions in Lebanon. Recruitment targeted overweight and obese adults aged 18 to 40 years old with a BMI of ≥ 25.0 kg/m^2 (either overweight or obese). Data on anthropometric measurements were self-reported by the participants. Pregnant or lactating women and individuals with mental disabilities were excluded from the study. Due to the observational nature of the study, the Internal Review Board (IRB) of the Lebanese university waived the need for an official approval; however, researchers and field worker conducted the study according to the research ethics guidelines laid down in the Declaration of Helsinki. [9] Participants were informed of the purpose of the study upon recruitment. Data was collected using a self-administered questionnaire including information about socio-demographic characteristics, cigarette smoking, self-reported weight and height, and three standardized questionnaires namely the Beirut Distress Scale (BDS-22), [10] the Body Shape Questionnaire (BSQ-16), [11] and the Eating Attitude Test (EAT-26). [12]

Psychological Distress was assessed using the Beirut Distress Scale (BDS-22) which is a validated tool designated to measure PD for the Lebanese adult population. [13] Respondents were asked to rate how often, in the past few weeks, they experienced several PD symptoms. The 22 items are answerable on a Likert scale from 0 indicating no experience of the symptoms to 3 indicating that the experience of the symptoms are severe (0- never, 1- sometimes, 2- often, and 3- always) with possible score from 0 to 66. The BDS-22, a measure created by adding all the items of the score, ranged from 0 to 66 with higher scores indicating greater risk of PD.

Body Mass Index (BMI): Based on participants' self-reported height and weight, BMI was calculated as weight in kilograms divided by height in meters squared. BMI was categorized as follows:

Overweight (BMI 25-29.9 Kg/ m^2) and obesity (BMI $\geq$ 30kg/m^2). [14]

Body image dissatisfaction was assessed using the BSQ-16 questionnaire that measures dissatisfaction with body size and shape. [11] The 16 items are answerable on a 6 point Likert scale ranging from "never" to "always" with possible score ranging from 16 to 96. Higher scores indicate greater risk of body shape dissatisfaction.

Covariate measures were selected based on literature reporting their potential relation to excessive weight and /or psychological distress. [7] Socio-demographic characteristics including age, gender, and income per family member (IPFM) which was defined as the household monthly income of a family divided by number of its members. Subsequently, the IPFM was classified into four categories (low, medium low, medium high and highest income), Current cigarette smoking status (yes/no), Eating Attitude Disorder test (EAT-26) which consists of 26 items that measure a broad range of symptoms characteristic of abnormal attitude towards food and eating. The test is scored using a six Likert scale with a choice of six answers ranging from "never" to "always" with possible score from 0 to 130. Higher scores are generally considered as indicative of increased risk for disordered eating behavior. [15]

Statistical analysis

Data were entered and analyzed using the statistical software SPSS (Statistical Package for Social Sciences), version 22.0.Descriptive statistics were reported using means and standard deviations (SD) for variables with adequate normal distribution, medians along with interquartile ranges (IQRs) for skewed continuous variables and frequency with percentages for categorical variables. Baseline characteristics were compared according to gender using chi-squared test for categorical variables, student *t*-test and Mann-Whitney U test for continuous variables. We explored the internal consistency of the BDS-22, BSQ-16 and EAT-26 by means of Cronbach's alphas and intra-class correlation coefficient (ICC). A coefficient of above 0.7 indicated a good internal consistency. [16] The distribution of BDS-22 data was markedly skewed; therefore bivariate and multivariate analyses with BDS-22 were conducted with natural log-transformed data after adding 1 to each value. Pearson correlation coefficients were used to assess simple correlations between study measurements (BDS-22, BMI, BSQ-16 and EAT-26). Multiple linear regression analyses were performed with BDS-22 as dependent variableto evaluate whether BMI and BSQ-16 significantly predicted PD in the overall sample. Two models were evaluated: the association between BMI and the BDS-22 was first examined (Model 1). Next, a second model, including the main effects of BMI and BSQ-16 was tested (Model 2). The two models were adjusted for age, gender, cigarette smoking, and eating test attitude (EAT-26). Finally, the moderating effect of gender and BMI categories on the association between BDS-22 and BSQ-16 were tested in the adjusted model using interaction terms. Linearity of the relationship, the normality of distribution of residuals, and the non-colinearity of retained variables were insured before the models were accepted. All statistical tests were two-sided, and the significant level was set at 0.05.

RESULTS

Table 1 depicts the baseline characteristics of the entire study sample according to gender. Total participants' number was 200 of which 66.5% were females. The mean age was 26.9 years (SD=6.1) ranging from 18 to 40 years. Our population consisted of mainly single adults (62.5%) and the majority had university education. Socio-demographic characteristics and body mass index did not show any statistical significant differences between males and females participating in the study.

Table1. Baseline characteristics of the participants by gender

Characteristics	All participants N=200 n (%)	Male n= 67 n (%)	Female n=133 n (%)	P-value
Age (Mean ±SD)	26.9±6.1	26.7±5.6	26.9±6.4	0.7
Marital status				
Single	125(62.5)	42(33.6)	83(66.4)	0.9
Other[†]	75(37.5)	25(33.3)	50(66.7)	
Education				
Secondary or less	20 (10)	8 (40)	12 (60)	0.5
University	180(90)	59 (32.8)	121 (67.2)	
Income-per-family member				
Low	55 (27.5)	21(38.2)	34(61.8)	0.7
Medium low	58 (29.0)	17(29.3)	41(70.7)	
Medium high	39 (19.5)	14(35.9)	25(64.1)	
Highest	46 (23.0)	14(30.4)	32(69.6)	
Cigarette smoking				
Non Smoker	173(86.5)	50(28.9)	123(71.1)	**<0.001***
Current smoker	27(13.5)	17(63.0)	10(37.0)	
BMI Category				
Overweight (BMI 25-29.9 Kg/m^2)	111(55.9)	33(29.7)	78(70.3)	0.21
Obese (BMI ≥ 30Kg/m^2)	89(44.1)	34(38.2)	55(61.8)	
BMI (Mean ±SD)	30.2±4.4	30.9±4.4	29.8±4.3	0.1

Note: n frequency, % percentage; SD standard deviation;†Married, divorced or widowed; BMI Body mass index; BDS-22 Beirut Distress Scale; BSQ-16 Body shape dissatisfaction; EAT-26 Eating attitude test, *p-value <0.05 is considered statistically significant.

Table 2 presents the median with interquartile range for the BDS-22 score and means along with standard deviations for BSQ-16 and EAT-26 scores in the overall sample and stratified by gender. The median BDS-22 score in the overall sample was 11.Scores of men and women on the BDS-22 were not significantly different (p-value >0.05).The overall mean scores of the BSQ-16 and EAT-26 were 39.3±16.0 and 34.6±15.9 respectively. However, the scores on body shape dissatisfaction (BSQ-16) and eating attitude test (EAT-26) were significantly higher among women than men suggesting that women were more dissatisfied with their body shape and tend to report greater eating disorder than men.

In our sample, the internal consistency index of the BDS-22, obtained by means of Cronbach's alpha coefficient was 0.93, with average intra-class correlation coefficient (ICC) = 0.928 (95% CI = 0.913–0.941; P-value < 0.001). Cronbach's alpha of the BSQ-16 was 0.94 with average intra-class correlation coefficient (ICC) = 0.937 (95% CI= 0.925-0.949; P-value<0.001). Concerning Eating attitude test (EAT-26), Cronbach's alpha was 0.8 with average intra-class correlation coefficient (ICC) = 0.800 (95% CI = 0.755–0.841; P-value < 0.001) (table 2).

Table 2 Descriptive Statistics and reliabilities of the study measurements: BDS-22, BSQ-16 and EAT-26.

Measure	All	Male	Female	P-value	Cronbach's α
BDS-22[a]	11(15)	10(19)	12(13)	0.14*	0.93
BSQ-16[b]	39.3±16.0	33.6±16.2	41.9±15.5	**<0.001****	0.94
EAT-26[b]	34.6 ±15.9	28.2±15.0	38.6±15.3	**<0.001****	0.80

SD Standard deviation, BMI Body mass index, BDS-22 Beirut Distress Scale, BSQ-16 Body Shape Questionnaire, EAT-26 Eating attitude test, [a]Median (Interquartile), *Statistical analysis conducted using the Mann-Whitney U test, [b]Mean values ± standard deviation, **statistical analysis conducted using student T test, P-value <0.05 is considered significant.

Table 3 displays Pearson correlation coefficients between BMI, body image dissatisfaction as measured by the BSQ-16 and the natural log transformed BDS-22in the overall sample and stratified by gender. Statistically significant associations were found between BMI and BSQ-16 in the overall sample and for men and women separately indicating that subjects who have higher BMI tend to report greater body image dissatisfaction. Scores on the BSQ-16 were positively correlated with natural log transformed BDS-22 (*r*=0.55; P-value<0.001) suggesting that individuals with greater body image dissatisfaction had higher level of distress. In addition,

correlation analysis between BDS-22 and BSQ-16 were also highly significant in male (r=0.74; p-value<0.001) and female (r=0.43; P-value<0.001). Furthermore, a positive correlation was found between EAT-26 and both BDS-22 and BSQ-16 scales (P-value<0.001). However, the association between BMI and both EAT-26 and BDS-22 were not found to be statistically significant.

Table 3- Inter-correlations between study measurements in the overall sample and stratified by gender

Measure	BMI	BDS-22	BSQ-16	EAT-26
All				
BMI	1.00			
BDS-22	0.053	1.00		
BSQ-16	**0.21***	**0.55***	1.00	
EAT-26	-0.08	**0.55***	**0.65***	1.00
Male				
BMI	1.00			
BDS-22	0.19	1.00		
BSQ-16	**0.35***	**0.74***	1.00	
EAT-26	0.003	**0.62***	**0.63***	1.00
Female				
BMI	1.00			
BDS-22	-0.003	1.00		
BSQ-16	**0.20****	**0.43***	1.00	
EAT-26	-0.10	**0.50***	**0.61***	1.00

BMI Body mass index; BDS-22 Beirut Distress Scale; BSQ-16 Body shape dissatisfaction; EAT-26 Eating attitude test, *P-value<0.001, **P-value<0.05, BDS-22 was used as log transformed values.

Multiple Linear regression analysis models for the association between BMI, BSQ-16 and BDS-22 in the overall sample are presented in table 4. As shown, no significant association was found between BMI and BDS-22 in the overall sample after controlling for age, gender, cigarette smoking, socioeconomic status and EAT-26 (Model 1). The adjusted second model containing the two predictors (BMI and BSQ-16) showed that BSQ-16 was associated with the log transformedBDS-22 in the overall sample (beta= 0.40; P-value < 0.001). The ANOVA of the final model gave highly significant results (p<0.001), with satisfactory residual linearity and colinearity diagnostics. The moderating effect of gender and BMI categories was tested in the adjusted models using interaction terms. The association between BSQ-16 and the log-transformed BDS-22 differed by gender only (P-value for interaction<0.001). Stratified analyses showed larger effect sizes for men (beta= 0.59, P-value<0.001) than for women (beta=0.28; P-value =0.004) in the association between the log-transformed BDS-22and BSQ-16. There was no statistical significant interaction for BMI categories on the association between BSQ-16 and the log-transformed BDS-22 (P-value for interaction=0.98).

Table 4; Multiple Linear regression analysis of the association between BMI, BSQ-16 and BDS-22

Dependent variable BDS-22	Predictor	Unstandardized Beta (95% CI)	Standardized Beta	P-value	Model summary R (R^2)
ALL (N=200)					
Model 1[a]					0.54(0.29)
	BMI	0.009 (-0.004-0.021)	0.081	0.19	
Model 2[b]					0.61(0.38)
	BMI	-0.003(-0.015-0.01)	-0.026	0.67	
	BSQ-16	**0.011 (0.007-0.016)**	**0.40**	**<0.001***	
Male (n=67)					
Model 1[a]					0.65(0.43)
	BMI	0.02(-0.002-0.004)	0.18	0.07	
Model 2[b]					0.77(0.60)
	BMI	-0.003(-0.002-0.018)	-0.024	0.79	
	BSQ-16	**0.019(0.011-0.026)**	**0.59**	**<0.001***	
Female (n=133)					
Model 1[a]					0.48(0.23)
	BMI	0.003(-0.013-0.018)	0.025	0.75	
Model 2[b]					0.52(0.28)
	BMI	-0.005(-0.021-0.011)	-0.046	0.57	
	BSQ-16	**0.008(0.003-0.013)**	**0.285**	**0.004***	

b – Multiple regression coefficient; CI – confidence interval, BDS-22: Beirut Distress Scale-22; BMI: Body mass index; BSQ-16: Body shape dissatisfaction; CI: confidence interval; *p-value <0.05 statistically significant. BDS-22 was used as log_{10} transformed values.
[a] Adjusted for age, gender, socio-economic status, cigarette smoking, and EAT-26.
[b] Adjusted for age, socio-economic status, cigarette smoking, and EAT-26.

DISCUSSION

This study investigated the effect of BMI and body image dissatisfaction on PD among Lebanese adults with excessive body weight. Our results highlighted the effect of body shape dissatisfaction rather than actual overweight status on PD. These findings are in line with those of a recent study conducted among Jordanian adult women in which BSQ-16 scores rather than BMI significantly increased the odds of depression. [17] Our study also showed that the association between body shape dissatisfaction and PD was statistically significant in both gender. Accordingly, it is vital to highlight the role of society and media in curving and shaping new values for physical appeal, affecting the Lebanese population by triggering social and psychological distress in both genders. Certainly, our findings are congruent with previous work identifying negative body image as a contributor to PD among females. [17] In fact, given the high value placed on achieving the ideal body shape, failure to meet the new morphological values will negatively affect self-perception among women. On top of that, the more extreme and difficult the standards are to achieve, the more the population, females in specific, will endure PD. Our study contributes to the emerging research on the development of body image among men by highlighting the negative effect of body shape dissatisfaction in the masculine population during adulthood. Indeed, previous published literature have indicated that muscle dissatisfaction rather than BMI among males is associated with PD. [18] These results support the distinction in recent research between body fat and muscularity as differential contributors to the development of negative body image in males.Results of the present study support a psychosocial rather than biological explanation for PD and pinpoint high risk categories of PD among adults with excessive body weight.

Strengths of the study include the use of a well-validated psychometric scale to screen for PD, the consistency of the findings with other studies and adjustment for several important covariates. However, the results of this study need to be considered in light of several methodological limitations. The relatively small sample size and the risk of selection bias due to the lack of randomization might have restricted the capacity to generalize our findings among the adult population. BMI, computed from self-reported height and weight values, is another limitation of this study. However, we don't expect this issue to affect our results since research have shown that self-reports are highly correlated with measured weights and heights and are valid to use in epidemiological and survey studies. [19] The study was also limited by its cross-sectional study design because causality cannot be ascertained whether distressed obese adults evaluate their bodies more negatively than do non-distressed peers, or whether those who are dissatisfied are at higher risk of PD compared to their satisfied counterparts.

Despite these limitations, findings of the present study have many implications for public health and clinical practices. By limiting the national response for excess weight to education about individual choices regarding nutrition and physical activity, important psychosocial factors such as negative body image are ignored. Our findings highlight the importance of considering the body image dissatisfaction as a marker of PD among overweight, and suggest that it should be evaluated to identify this particular subgroup. Thus, more involvement should be missioned to implement preventive programs in order to reduce the effect of body image on the overweight and obese populations. Public health interventions targeting PD at the population level may need to encourage self-acceptance regardless of weight status.

CONCLUSION

In summary, overweight and obese individuals suffering from body image dissatisfaction are at increased risk of PD.

Our findings have the potential to enhance the knowledge of health professionals, researchers and policy makers with regard to the effect of body image on PD and may indicate that strategies promoting weight loss among adults with excessive body weight should also integrate a psychosocial component focused on promoting self-acceptance regardless of weight status. Whether such strategy could be applied for the prevention of PD should be the focus of future studies.

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