

Association Between Adult Attachment Styles and Disordered Eating Among a Sample of Lebanese Adults

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Abstract

Objectives

The current study will be the first to investigate relationships between attachment styles and disordered eating (binge eating, restrained eating, emotional eating, orthorexia tendencies and behaviors, and eating attitudes) and to check if these associations are mediated by body dissatisfaction among Lebanese adults.

Design

cross-sectional study.

Setting

all Lebanese governorates.

Participants

A total of 811 participants was randomly selected to participate in this five-month study (January to May 2018).

Results

Having an anxious attachment style was significantly associated with higher emotional eating, whereas having an avoidant attachment style was significantly associated with more inappropriate eating (higher EAT-26 scores) and more orthorexia nervosa (lower ORTO-R scores). Finally, having a secure attachment style was significantly associated with more appropriate eating (lower EAT-26 scores). Higher body dissatisfaction was significantly associated with higher orthorexia nervosa (lower ORTO-R scores), higher binge and restrained eating. Body dissatisfaction partially mediated the association between having an anxious attachment style and restrained eating (17.25%), having a secure attachment style and emotional eating (12.53%), eating attitudes (7.12%) and binge eating (21.47%), as well as the association between having an avoidant attachment style and orthorexia nervosa (9.75%).

Conclusion

In conclusion, this research showed that attachment insecurity affected the maintenance of disordered eating symptoms and that body dissatisfaction plays a mediator role between adult attachment and disordered eating. Clinicians may consider interviewing or self-reporting measures to assess attachment insecurity.

Plain English Summary

The relationship between various styles of attachment and particular subtypes of eating disorders remains inconclusive in the literature. Eating disorders were related to attachment insecurity regardless of a specific style however, the two dimensions of insecure attachment (avoidant and anxious) and disordered eating were undetermined. Also, the relationship between eating disorders and attachment styles can be mediated by body dissatisfaction. A sample of 811 participants, selected randomly from the general population, were recruited to study the relationships between attachment styles and disordered eating. The quantitative analysis revealed that disordered eating is related to body dissatisfaction and adult attachment. Body dissatisfaction plays a mediator role between adult attachment and disordered eating. As body dissatisfaction perpetuates disordered eating, clinicians should carefully examine the primary role of attachment and the mediator role of body dissatisfaction, taking into consideration the significant impact of this dynamic on psychotherapy. Further longitudinal studies are needed to confirm the findings of this study and clarify the mediating role of body dissatisfaction between adult attachments and disordered eating.

Introduction

Researchers always strive to understand the association between attachment styles, body image concerns, and problematic eating attitudes and behaviors, including binge eating, restrained eating, emotional eating, and orthorexia.

Eating disorders (ED) are complex psychiatric illnesses characterized by body image dissatisfaction with severe medical consequences⁽¹⁾. They are associated with a marked deterioration in the quality of life and an impact on personal and social life^(2,3). Binge eating disorder (BED) is characterized by a loss of control to stop eating and by overeating and consuming large amounts of food in a short time, followed by overwhelming feelings of guilt⁽⁴⁾. Restrained eating behavior (RE) is the intention to restrict dietary intake either to avoid weight gain or to lose weight^(5,6). Emotional eating is a common and problematic eating behavior in response to negative affect⁽⁷⁾; emotional eaters usually eat more when they face negative emotions⁽⁸⁾. Orthorexia Nervosa is characterized by an excessive preoccupation with eating healthy food that remained unclassified in the Diagnostic and Statistical Manual of Mental Disorders 5th edition⁽⁹⁾. Orthorexic people remove from their diets foods they consider to be impure and worry about the materials used in food production⁽¹⁰⁾. Eating attitudes are behaviors, feelings, and thoughts towards foods. Disordered eating are linked to a disturbance in eating attitudes⁽¹¹⁾. Disordered eating attitudes occur more in women and are more correlated with higher body weight⁽¹²⁾ and body shape concern⁽¹³⁾.

Attachment theory is a psychological model that provide an integrative approach for understanding and describing interpersonal relationships. Improving the functioning of the attachment contributes to positive effects in eating disorders treatment⁽¹⁴⁾. Hazan and Shaver described three adult attachment styles⁽¹⁵⁾. These include secure attachment and two types of insecure attachment: avoidant and anxious attachment. Secure attachment is a crucial protective factor of

mental health and stable self-structure⁽¹⁶⁾; it is characterized by self-confidence, independence, and an ability to interact with others. However, avoidant attachment pattern is usually dismissive of close relationships, and anxious attachment is described by an intense need to maintain close relationships with others. Attachment dysfunctions can contribute to self-disturbances^(16, 17). Insecure attachment is linked to several negative outcomes, such as lower academic achievement, low self-esteem, and psychopathology, including disordered eating⁽¹⁸⁾.

Different studies showed a positive correlation between insecure adult attachment and the expression and maintenance of unhealthy eating attitudes and behaviors⁽¹⁹⁾ and eating disorders at both clinical and sub-clinical level^(20–22). Insecure attachment was shown to be associated restraint eating⁽²³⁾ and binge eating⁽²⁴⁾. A systematic review of 154 studies showed that insecure attachment and negative self-image were highly correlated to eating disorders⁽²⁵⁾. In addition, Tasca et al. showed that 80–100% of individuals with eating disorders had insecure attachment⁽²⁶⁾. Indeed; unhealthy eating attitudes and behaviors were associated with insecure attachment^(26–29). However the literature investigating the relationship between various styles of attachment and particular subtypes of eating disorders remains inconclusive^(29, 30). Eating disorders, were linked to high attachment insecurity regardless of a specific style^(26, 31). Furthermore, the various interactions between the two dimensions of insecure attachment (avoidant and anxious) and disordered eating were determined. Attachment anxiety and avoidance were respectively associated with binge eating and bulimic-spectrum disorders and restricting-type anorexia nervosa^(32, 33). Restricted eating was seen as an effort to avoid the negative emotions, related to an emotional cut-off while binge eating was seen as a self-medication for distress with foods, related to an emotional reactivity^(34–36). Orthorexia nervosa was shown to be correlated to negative body image attitudes, and insecure attachment and avoidant styles⁽³⁷⁾.

Insecure attachment is not sufficient to trigger alone the mental disorders⁽³⁸⁾, Researchers showed that the relationship between eating disorders and attachment styles can be mediated by body dissatisfaction^(26, 39, 40). A meta-analysis study have showed that the indirect effect of insecure attachment on ED symptoms through body dissatisfaction yielded not significant effect size among ED samples⁽³⁹⁾. The indirect effect of body dissatisfaction were significant in studies with non-clinical population (72%)⁽³⁹⁾. A body image disturbance is linked to unhealthy eating attitudes and behaviors and is recognized as a risk factor for eating disorders⁽⁴¹⁾. Insecure attachment was shown to be associated to body dissatisfaction⁽⁴²⁾ and higher weight concerns⁽⁴³⁾. Studies showed that girls with insecure attachments have a high level of negative body image, leading to thinness, disturbed eating patterns, bulimia, and eating disorders risk^(44, 45). The positive correlation between binge eating, restraint eating and other eating disorders and body dissatisfaction were deeply discussed in literature^(46–48). While the relationship between Orthorexia Nervosa and body dissatisfaction remained unclear. Some studies showed a positive correlation^(49–51) while others reported the absence of this association^(52–54).

Indeed insecure attachment and high body dissatisfaction were shown to be associated with eating disorders⁽⁵⁵⁾. Individuals with insecure attachment are more likely to express negative feelings about themselves and use dieting to achieve perfect body image, binge eating to improve their feelings and purging to avoid weight gain^(34, 56, 57).

Almost the previous studies focused on the relationship between attachment style and eating disorders^(26, 58), few of them reviewed the mediator role of body dissatisfaction linking insecure attachment to eating disorders⁽³⁹⁾.

Indeed, regarding the Lebanese populations, most of the studies discussed the prevalence of eating disorders⁽⁵⁹⁾, others determined the different factors associated with restrained eating, such as body dissatisfaction, eating attitudes, and adult attachment⁽⁶⁰⁾, or determined the effect of body dissatisfaction on orthorexia nervosa, binge eating, and restrained eating⁽⁶¹⁾. In a previous study, Saade et al. showed that binge eating in Lebanese adults was correlated with the anxious attachment⁽⁶²⁾. Regarding orthorexia, studies showed its correlation with negative body image attitudes, as well as insecure attachment and avoidant styles⁽³⁷⁾. There is a lack of data within the Lebanese populations about the mediator role of the body dissatisfaction linking the relationship between eating disorders and attachment style. Based on all these information, this study aimed to check how the body dissatisfaction mediates the relationship between the attachment adult and disordered eating, thus contributing to a better understanding of maintained disordered eating⁽¹⁹⁾. Based on previous studies^(19, 21, 60, 63–77), a model has been specifically constructed for this study to evaluate the directional association between body dissatisfaction, adult attachment, and disordered eating (Fig. 1).

Methods

Participants

This cross-sectional study was conducted between January and May 2018. Out of 1000 distributed questionnaires, 811 (81.1%) were completed and collected back. All participants above 18 years of age were eligible to participate. Excluded were those suffering from a clinical mental impairment (as reported by a family member) affecting cognition and their ability to understand the questionnaire or to answer it. Participants were enrolled proportionately and randomly from all districts of all Lebanese governorates. In each district, two villages were randomly selected from the list provided by the Central Agency of Statistics in Lebanon. In each selected village, a random sampling technique was used to choose households to include to distribute the questionnaire. All eligible members in the household were invited to participate. They had the right to accept or refuse to enroll, and no financial compensation was provided in exchange for individual participation. Those who agreed were asked to sign written informed consent and fill out the questionnaire. Before enrolling, participants were briefed on the study objectives and methodology and were assured of the anonymity of their participation. The same methodology was used in previous papers^(61, 78, 79).

Ethical Aspect

The Psychiatric Hospital of the Cross Ethics and Research Committee endorsed this research protocol (HPC-020-2018). Written informed consent was obtained from each participant.

Sample Size Calculation

The G-power software calculated a minimum sample of 395 participants, based on an effect size $f^2 = 2\%$, an alpha error of 5%, a power of 80%, and considering 20 factors to be entered in the multivariable analysis.

Questionnaire

The questionnaire used was in Arabic, the mother tongue in Lebanon. The first part evaluated the participants' sociodemographic information, such as age, gender, marital status, academic level, and monthly earnings (divided into: no income, low income < 1,000 USD, intermediate income 1,000–2,000 USD, and high income > 2,000 USD).

The second part included the following scales:

State Adult Attachment Measure (SAAM)

The SAAM measures three distinct aspects of adult attachment: security, avoidance, and anxiety. It includes 21 items rated on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). Higher scores on each subscale reflect higher security, avoidance, and anxiety, respectively⁽⁸⁰⁾ (Cronbach's alpha for the total score was 0.827, for the security attachment was 0.564, for the anxiety attachment was 0.647 and for the avoidance attachment was 0.495).

Body dissatisfaction subscale of the Eating Disorder Inventory-second version (EDI-2):

This scale assesses the dissatisfaction rates with the general body shape and specific body parts. The subscale of body dissatisfaction consists of nine items measured on a 6-point Likert scale from 0 (never) to 6 (always). Higher scores indicate a higher body dissatisfaction⁽⁸¹⁾ (Cronbach's alpha = 0.779).

Binge Eating Scale (BES)

The BES, validated in Lebanon⁽⁸²⁾, was initially created within an obese population to recognize binge eaters⁽⁸³⁾. The BES is a 16-item questionnaire assessing the presence of certain binge eating behaviors which may be indicative of an eating disorder. The overall score is the sum of the 16 items. Higher scores indicate more binge eating⁽⁸⁴⁾ (Cronbach's alpha = 0.862).

Dutch Restrained Eating Scale (RES)

The Dutch Restrained Eating Scale, validated in Lebanon⁽⁸⁵⁾, consists of ten items scored on a 5-point Likert scale from 1 (rarely) to 5 (very often). The average score is calculated by dividing the total score by the number of items. Higher scores indicate higher restrained eating⁽⁸⁶⁾ (Cronbach's alpha = 0.928).

Emotional Eating Scale (EES)

The EES scale consists of 25 items, validated in Lebanon⁽⁸⁷⁾, with three derived subscales: anger, anxiety, and depression. Participants rate the extent to which certain feelings lead to the urge to eat, using a 5-point Likert scale from 0 (no desire to eat) to 4 (an overwhelming urge to eat). The total score is calculated by summing the answers to all items. The highest possible score is 100. Higher scores indicate a reliance on using food to help managing emotions⁽⁸⁸⁾ (Cronbach's alpha = 0.957).

The revised version of ORTO-15 (ORTO-R)

The ORTO-R was based on the most frequently used items from the ORTO-15 scale⁽⁸⁹⁾. It consists on 6 items rated on a 4-point Likert scale (never, occasionally, often, and always)⁽⁸⁹⁾. In this study, participants who had lower scores were considered as having orthorexia nervosa tendencies and behaviors (Cronbach's alpha = 0.822).

Forward and back translation procedure

A forward and backward translation was performed for all scales, except the BES, RES, and ORTO-R. One translator translated the scales from English into Arabic, and a group of professionals confirmed the Arabic translated version. To prevent bias, another translator, fluent in Arabic and unfamiliar with the concept of the scales, conducted a backward translation to English. There were no discrepancies between the two English versions.

Statistical analysis

Data analysis was performed on SPSS software Version 23. Cronbach's alpha values were recorded to assess the reliability of all scales. The total missing values were less than 10% of the whole database therefore there were not replaced. Since the sample size recruited, was more than 100, the data was considered normally distributed and therefore parametric tests were used⁽⁹⁰⁾. Pearson correlation analyses were used for continuous variables, and Student t-test and ANOVA F tests for categorical variables with two or more levels, to assess the association of variables with the continuous scales. A multivariate analysis of covariance (MANCOVA) assessed the association between the different attachment styles and each disordered eating taken as a dependent variable, after adjustment for the sociodemographic variables (age, gender, BMI, education level, monthly income, and marital status).

Mediation analysis

The PROCESS SPSS Macro version 3.4 model four⁽⁹¹⁾ was used to calculate three pathways (Fig. 1). The PROCESS SPSS Macro is a path analysis-modeling tool used to estimate direct and indirect effects in mediator models with a single or multiple mediators or moderators. Pathway A determined the regression

coefficient for the effect of attachment styles on body dissatisfaction, Pathway B examined the association between body dissatisfaction and each disordered eating, and Pathway C estimated the total and direct effect of each attachment style on each disordered eating. Pathway AB calculated the indirect intervention effects. The macro generated bias-corrected bootstrapped 95% confidence intervals (CI) to test the significance of the indirect effect⁽⁹¹⁾. A significant mediation was determined if the CI around the indirect effect did not include zero⁽⁹¹⁾. The covariates included in the mediation model were those that showed significant associations with each disordered eating score in the bivariate analysis. A value of $p < 0.05$ was considered significant.

Results

Table 1 summarizes the participants' sociodemographic features (mean age: 27.59 ± 11.76 years; 66.5% females).

Bivariate analysis of factors associated with the disordered eating scores

The results of the bivariate analysis of factors associated with the disordered eating scores are summarized in Tables 2 and 3. A higher restrained eating mean score was found in females compared to males $t(802) = -4.21, p < 0.001, d_{\text{cohen}}=0.31$, married vs. single status $t(807) = -2.90, p = 0.004, d_{\text{cohen}}=0.23$, in those with a high monthly income vs. all other categories $F(3, 748) = 3.25, p = .02$ and those who practiced sports during the last 12 months vs. not $t(782) = -4.44, p < 0.001, d_{\text{cohen}}=0.33$.

Lower ORTO-R scores (more orthorexic tendencies and behaviors) were found in female participants compared to their male counterparts $t(802) = -4.21, p < 0.001, d_{\text{cohen}}=0.31$. Higher binge eating mean scores were found in participants with an intermediate monthly income vs. all other categories $F(3, 723) = 3.02, p = .02$.

Higher body dissatisfaction was significantly associated with more restrained eating $r(807) = .29, p < .001$, emotional eating $r(807) = .07, p < .05$, and binge eating $r(807) = .25, p < .001$. Higher age was associated with more restrained eating $r(807) = .13, p < .001$ and less emotional eating $r(807) = -.08, p < .01$. Higher body mass index was significantly associated with more restrained $r(807) = .23, p < .001$ and binge eating $r(807) = .18, p < .001$.

Adjusted means

Figures 2, 3, and 4 show the means of disordered eating scores, according to the presence/absence of anxious/avoidant/secure attachment styles, after adjusting for the covariates that showed significance in the bivariate analysis. The results revealed that a higher mean orthorexia nervosa was found in people with higher security attachment (Figure 2). Higher mean binge eating scale was found in people with higher avoidance attachment (Figure 3). Higher mean restrained eating and binge eating scores were found in participants with higher anxiety attachment. Higher mean of ORTO-R (lower orthorexia nervosa) was found in participants without an anxiety attachment (Figure 4).

Multivariate analysis

The MANCOVA analysis was performed taking the disordered eating scales as dependent variables and the attachment styles as the independent variable, adjusting for the covariates (age, gender, smoking, education level, monthly income, and marital status).

Having an anxious attachment style was significantly associated with higher emotional eating, whereas having an avoidant attachment style was significantly associated with more inappropriate eating (higher EAT-26 scores) and more orthorexia nervosa (lower ORTO-R scores). Finally, having a secure attachment style was significantly associated with more appropriate eating (lower EAT-26 scores). Higher body dissatisfaction was significantly associated with higher orthorexia nervosa (lower ORTO-R scores), higher binge, and restrained eating (Table 4).

Mediation analysis

Body dissatisfaction partially mediated the association between having an anxious attachment style and restrained eating (17.25%), having a secure attachment style and emotional eating (12.53%), and binge eating (21.47%), as well as the association between having a secure attachment style and orthorexia nervosa (16%) (Table 5). No mediation effect of body dissatisfaction was found between the attachment styles and other disordered eating.

Discussion

The current study highlighted the relationship between adult attachment and disordered eating and the mediating role of body dissatisfaction. The multivariable analysis showed how insecure attachment is positively correlated with disordered eating, while the secure one is associated with appropriate eating. Indeed, body dissatisfaction is linked to disordered eating, such as binge eating, restrained eating, and orthorexia nervosa. Moreover, this study identified the mediating role of body dissatisfaction between adult attachment and disordered eating. Body dissatisfaction mediates partially from one side the relationship between secure attachment and emotional eating, eating attitude and binge eating, and from another side the relationship between avoidant attachment and orthorexia nervosa, and between anxious attachment and restrained eating.

Body Dissatisfaction

Higher body dissatisfaction was significantly associated with higher orthorexia nervosa, higher binge, and restrained eating. Restrained eating was positively correlated with body dissatisfaction^(60, 92, 93). An increase in dietary restraint predicted an elevation in body dissatisfaction⁽⁹⁴⁾. As for binge eating, it is positively correlated to body dissatisfaction, which is in agreement with different studies^(95, 96). Consistent with other studies, a correlation was also found between orthorexia nervosa and body dissatisfaction^(79, 97, 98).

Additionally, this study showed that body dissatisfaction was a mediator between attachment patterns and disordered eating. It partially mediated the association between an anxious attachment style and restrained eating⁽⁹⁹⁾. Consistent with previous studies, restrained eating was positively related to anxiety attachment and BMI⁽¹⁰⁰⁾. Indeed, anxiety significantly affected the relationship between body dissatisfaction and restrained eating⁽¹⁰¹⁾. Individuals with high anxious attachment have high body dissatisfaction, are more likely to rely on external sources such as food, and tend to be poorer to regulate their emotions/stress⁽¹⁰²⁾.

Furthermore, body dissatisfaction partially mediates the association between secure attachment and emotional eating and eating attitude and binge eating. Body dissatisfaction is correlated to emotional eating⁽¹⁰³⁾, eating attitude⁽¹⁰⁴⁾, and binge eating⁽⁹⁵⁾, while the insecure attachment is more known to be a risk factor for the emergence of disordered eating⁽³⁹⁾. Binge eating was more related to the anxious attachment, while restrained eating was more related to the avoidant attachment⁽³³⁾. These results are not consistent concerning these associations. Further studies are warranted to clarify the mediating role of body dissatisfaction between secure attachment and emotional eating and eating attitude and binge eating.

Moreover, body dissatisfaction mediates the association between the avoidant attachment style and orthorexia nervosa as well. Few studies explored the body image disturbance and the type of attachment in persons with orthorexia nervosa. Currently, the association between the adult attachment style and orthorexia nervosa is still not fully explored. Barnes et al. showed that orthorexia nervosa correlated negatively to the avoidant dismissive attachment⁽³⁷⁾ and that it shared a similar profile with anorexia nervosa and bulimia nervosa⁽³⁷⁾. Indeed, the positive correlation between orthorexia nervosa and body image disturbance appeared in one study⁽¹⁰⁵⁾. Further studies are needed to clarify the relationship between orthorexia nervosa, avoidant attachment, and body dissatisfaction.

People with secure attachment showed low levels of body dissatisfaction, while those with high anxiety and high avoidance showed high levels. These results are in agreement with previous studies showing that body dissatisfaction was linked to early separation anxiety and the insecure attachment style^(55, 106).

Eating attitude test

People with insecure attachment styles tend to have high scores of eating attitudes test. This result is in agreement with those of many studies showing that females with a secure attachment style had the lowest average score on EAT, while those with some insecure attachment styles had higher mean scores^(28, 107, 108). The insecure attachment appears to be a risk factor for the development of disordered eating^(29, 58) and is associated with unhealthy eating attitudes and behaviors⁽²⁸⁾. The latter can be the manifestation of the negative emotions resulting from insecure attachment⁽²⁷⁾. People with insecure attachment tend to compensate for their negative feelings by turning to unhealthy eating attitudes⁽²⁹⁾.

Orthorexia Nervosa

In our study, orthorexia tendencies and behaviors showed to be associated with an avoidant attachment. The association between orthorexia nervosa and avoidant attachment was discussed in the body dissatisfaction part. Indeed, females showed more orthorexia nervosa than males. Consistent with previous studies, higher orthorexia nervosa symptomatology appeared in women more than men^(109, 110). It is noteworthy that other studies found either higher orthorexia nervosa symptomatology in men than women^(111, 112) or no gender differences^(113–115). This correlation has to be further investigated since the majority of the participants in our sample were women (66.5%). Therefore, this outcome should be treated with caution.

Clinical Implications

This study showed that disordered eating is related to body dissatisfaction and adult attachment; it also showed how body dissatisfaction mediates the association between adult attachment and disordered eating. These results suggest that clinicians should focus on body image and attachment concerns. As body dissatisfaction perpetuates disordered eating, clinicians should carefully examine the primary role of attachment and the mediator role of body dissatisfaction, taking into consideration the significant impact of this dynamic on psychotherapy⁽¹¹⁶⁾. Clinicians should evaluate the attachment level of the patient to ensure an efficient and successful therapy⁽²⁸⁾. Moreover, they have to focus on the mediators that maintain or increase the symptoms of disordered eating⁽¹¹⁷⁾.

Limitations

This study has several worth noting limitations. Selection bias is possible; indeed, our sample did not include a heterogeneous population for age, gender, education, marital status, and socioeconomic status. Information bias is also possible since the results relied on self-reports, as individuals were assessed using a scoring tool and not by professional screening interviews. Residual confounding bias is probable since not all factors associated with disordered eating were taken into consideration in this study. It is suggested to study the association between disordered eating and adult attachments with a larger sample, including both clinical and non-clinical groups. The design of the current study was cross-sectional, which cannot infer causality. Longitudinal studies are warranted to understand the potential risk for disordered eating resulting from attachment insecurity, and the processes by which this happens. Finally, it is noteworthy that not all the scales have been validated in Lebanon yet.

Conclusion

Regardless of the measurement approach, this research showed that attachment insecurity affected the maintenance of disordered eating (binge eating, restrained eating, emotional eating, orthorexia nervosa) symptoms and that body dissatisfaction plays a mediator role between adult attachment and disordered eating. These findings suggest that it may be useful to take disordered eating, body dissatisfaction, and attachment history into account when starting a treatment or developing prevention strategies. Further longitudinal studies are needed to confirm our findings and clarify the mediating role of body dissatisfaction between adult attachments and disordered eating.

Abbreviations

ED: Eating disorders, BED: Binge eating disorder, RE: Restrained eating behavior, HPC: Psychiatric Hospital of the Cross, USD: United States dollar, SAAM: State Adult Attachment Measure, EDI: Eating Disorder Inventory, BES: Binge Eating Scale, RES: Dutch Restrained Eating Scale, EES: Emotional Eating Scale, SPSS: Statistical Package for the Social Sciences, MANCOVA: multivariate analysis of covariance, ANOVA: Analysis of variance, BMI: Body Mass Index, CI: confidence intervals, EAT: Eating Attitudes Test.

Declarations

Ethical Approval

The Psychiatric Hospital of the Cross Ethics and Research Committee endorsed this research protocol (HPC-020-2018). Written informed consent was obtained from each participant.

Consent for publication

Not applicable.

Availability of data and materials

Data can be made available under reasonable request form the corresponding author.

Competing interests

The authors have nothing to disclose.

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None.

Authors' contribution

SH, SO designed the study; MZ, CH drafted the manuscript; SH, CH carried out the analysis and interpreted the results; PS, HS, RH, MA, NK assisted in drafting and reviewing the manuscript; PS, SH supervised the course of the article. All authors reviewed and approved the final version of the manuscript.

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Tables

Table 1 : Sociodemographic characteristics of the study sample	
	Frequency (%)
Gender	
Male	270 (33.5%)
Female	536 (66.5%)
Marital status	
Single	533 (67.0%)
Married	230 (28.9%)
Widowed	11 (1.4%)
Divorced	22 (2.8%)
Education level	
Primary	24 (3.1%)
Complementary	61 (7.8%)
Secondary	125 (15.9%)
University	574 (73.2%)
Monthly income	
No income	340 (45.1%)
Lo income < 1000 USD	247 (32.8%)
Intermediate 1000 – 2000 USD	117 (15.5%)
High > 2000 USD	50 (6.6%)
Mean ± SD	
Age (in years)	27.82 ± 11.71
Body Mass Index (Kg/m²)	24.35 ± 5.28

Table 2. Bivariate analysis of factors associated with the disordered eating scales.				
Variable	RES	EES	ORTO-R	BES
Gender				
Male	2.35 ± 0.92	36.48 ± 21.38	6.74 ± 3.77	9.10 ± 7.84
Female	2.65 ± 0.97	34.37 ± 19.60	7.39 ± 3.83	8.92 ± 7.54
<i>p</i>	<0.001	0.190	0.026	0.964
<i>d_{cohen}</i>	0.317	-0.103	0.171	-0.023
Marital status				
Single	2.49 ± 0.98	35.46 ± 20.52	7.12 ± 3.82	8.66 ± 7.41
Married	2.71 ± 0.92	34.06 ± 19.54	7.27 ± 3.81	9.75 ± 8.11
<i>p</i>	0.003	0.385	0.623	0.129
<i>d_{cohen}</i>	0.231	-0.07	0.039	0.14
Education level				
Primary/ complementary	2.56 ± 0.90	34.78 ± 19.49	7.43 ± 4.12	9.87 ± 7.83
Secondary	2.56 ± 0.98	34.56 ± 19.97	6.63 ± 3.65	9.96 ± 8.25
University	2.55 ± 0.97	35.12 ± 20.24	7.18 ± 3.81	8.65 ± 7.43
<i>p</i>	0.996	0.890	0.268	0.174
<i>d_{cohen}</i>	0.005	0.01	0.058	0.073
Monthly income				
No income	2.49 ± 0.98	34.85 ± 20.04	6.88 ± 3.71	9.45 ± 7.64
Low (<1000 USD)	2.51 ± 0.97	36.59 ± 20.99	7.13 ± 3.95	7.67 ± 7.07
Intermediate (1000-2000 USD)	2.74 ± 0.92	33.86 ± 20.97	7.41 ± 3.93	9.64 ± 8.85
High (>2000 USD)	2.80 ± 0.83	34.83 ± 17.40	7.59 ± 3.63	9.26 ± 7.76
<i>p</i>	0.022	0.656	0.465	0.028
<i>d_{cohen}</i>	0.091	0.039	0.047	0.089
Physical activity in the last 12 months				
No	2.36 ± 0.96	34.59 ± 20.90	6.85 ± 3.83	8.68 ± 7.84
Yes	2.68 ± 0.96	34.97 ± 19.51	7.32 ± 3.75	8.95 ± 7.57
<i>p</i>	<0.001	0.733	0.099	0.451
<i>d_{cohen}</i>	0.333	0.019	0.124	0.035
RES: Dutch Restrained Eating Scale, EES: Emotional Eating Scale, ORTO-R: Revised Orthorexia Nervosa scale, BES: Binge Eating Scale.				

Table 3. Correlation coefficients of continuous variables associated with the disordered eating scales.				
Variable	RES	EES	ORTO-R	BES
Body dissatisfaction	0.293 ^a	0.073 ^c	-0.066	0.250 ^a
Age	0.136 ^a	-0.088 ^c	-0.021	-0.066
Body Mass Index	0.238 ^a	0.042	-0.024	0.189 ^a
SAAM Anxiety	0.154 ^a	-0.130 ^a	-0.055	-0.054
SAAM Security	0.060	-0.148 ^a	-0.178 ^a	-0.173 ^a
SAAM Avoidance	0.082 ^c	-0.036	0.083 ^c	0.012
RES	-	-0.049	0.309 ^a	0.096 ^b
EES	-0.049	-	0.248 ^a	0.259 ^a
ORTO-R	0.309 ^a	0.248 ^a	-	0.269 ^a
BES	0.096 ^b	0.259 ^a	0.269 ^a	-
^a p<0.001; ^b p<0.01; ^c p<0.05				
RES: Dutch Restrained Eating Scale, EES: Emotional Eating Scale, ORTO-R: Revised Orthorexia Nervosa scale, BES: Binge Eating Scale.				

Table 4: Multivariate analysis of covariance (MANCOVA)					
	Beta	<i>p</i>	95% Confidence Interval		Partial Eta Squared
			Lower Bound	Upper Bound	
EES score					
Body Mass Index	0.52	0.017	0.09	0.95	0.014
SAAM anxiety (yes vs no*)	4.83	0.018	0.08	8.85	0.013
SAAM avoidance (yes vs no*)	-0.43	0.826	-4.28	3.41	0.001
SAAM security (yes vs no*)	-3.29	0.126	-7.51	0.93	0.006
ORTO-R total score					
Body dissatisfaction	-0.08	0.036	-0.16	-0.01	0.011
Self-esteem	0.28	0.011	0.06	0.49	0.015
SAAM anxiety (yes vs no*)	0.29	0.510	-0.58	1.16	0.001
SAAM avoidance (yes vs no*)	-1.08	0.011	-1.91	-0.25	0.015
SAAM security (yes vs no*)	-0.39	0.4	-1.30	0.52	0.002
BES score					
Body Mass Index	0.29	<0.001	0.13	0.44	0.03
Body dissatisfaction	0.32	<0.001	0.19	0.45	0.052
Gender (Females vs. males*)	1.68	0.033	0.14	3.21	0.011
SAAM anxiety (yes vs no*)	-0.72	0.338	-2.18	0.75	0.002
SAAM avoidance (yes vs no*)	-0.21	0.766	-1.62	1.19	<0.001
SAAM security (yes vs no*)	-1.32	0.092	-2.86	0.22	0.007
RES total score					
Body Mass Index	0.03	0.001	0.01	0.05	0.027
Body dissatisfaction	0.04	<0.001	0.02	0.05	0.045
Gender (females vs males*)	0.41	<0.001	0.23	0.60	0.044
SAAM anxiety (yes vs no*)	0.07	0.453	-0.11	0.25	0.001
SAAM avoidance (yes vs no*)	0.06	0.517	-0.11	0.23	0.001
SAAM security (yes vs no*)	0.13	0.180	-0.06	0.31	0.004
Note: In the global model, the independent variables were the attachment styles. Covariates are: age, gender, education level, monthly income, body mass index and marital status.					
RES: Dutch Restrained Eating Scale, EES: Emotional Eating Scale, ORTO-R: Revised Orthorexia Nervosa scale, BES: Binge Eating Scale.					

*Reference group

Table 5. Mediation analysis.																
Model 1: Restrained eating.																
	Effect of the attachment style on body dissatisfaction				Effect of the attachment style and body dissatisfaction on disordered eating					Direct effect of the attachment style on disordered eating				Mediated effect c dissatisfaction		
	Beta	95% BCa CI	t	p	Beta	95% BCa CI	t	p	Beta	95% BCa CI	t	p				
Anxious attachment	-0.65	-1.51	0.20	-1.50	0.134	-0.16	-0.30	-0.02	-2.26	0.024	-0.19	-0.34	-0.04	-2.57	0.01	17.25%
Body dissatisfaction						0.04	0.03	0.05	6.92	<0.001						
Model 2: Emotional eating.																
Secure attachment	1.54	0.66	2.42	3.43	<0.001	3.51	0.44	6.58	2.25	0.024	3.95	0.90	7.01	2.54	0.011	12.53%
Body dissatisfaction						0.29	0.04	0.53	2.28	0.022						
Model 3: Orthorexia nervosa.																
Secure attachment	0.05	0.01	0.09	2.43	0.015	0.05	0.02	0.08	3.88	0.001	0.06	0.03	0.09	4.35	<0.001	16%
Body dissatisfaction						0.16	0.10	0.21	6.07	<0.001						
Model 4: Binge eating.																
	Beta	95% BCa CI	t	p	Beta	95% BCa CI	t	p	Beta	95% BCa CI	t	p				
Secure attachment	1.00	0.21	1.78	2.49	0.013	1.16	0.09	2.22	2.13	0.033	1.40	0.32	2.49	2.55	0.01	21.47%
Body dissatisfaction						0.25	0.15	0.35	5.01	<0.001						

Figures

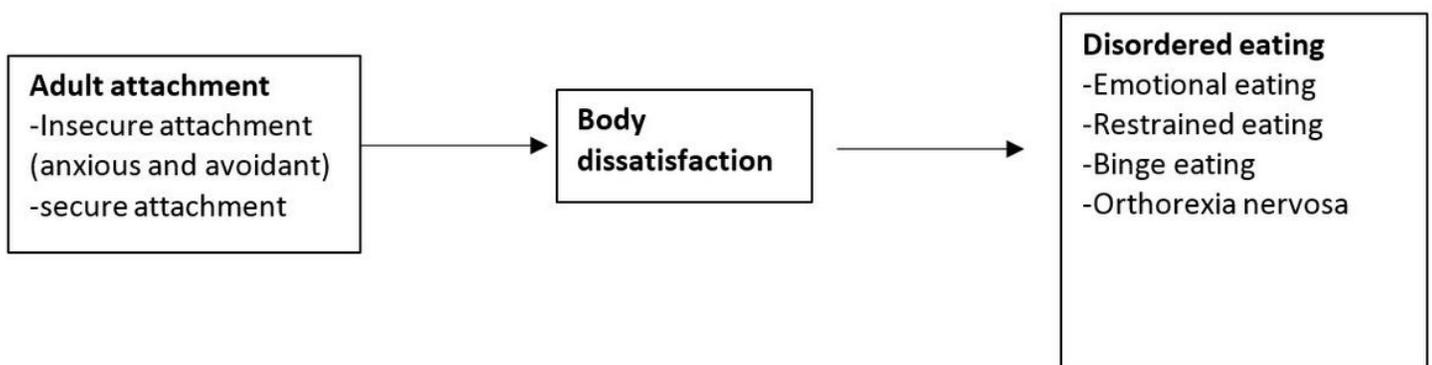


Figure 1

A model assessing the relationships among body dissatisfaction, adult attachment and disordered eating

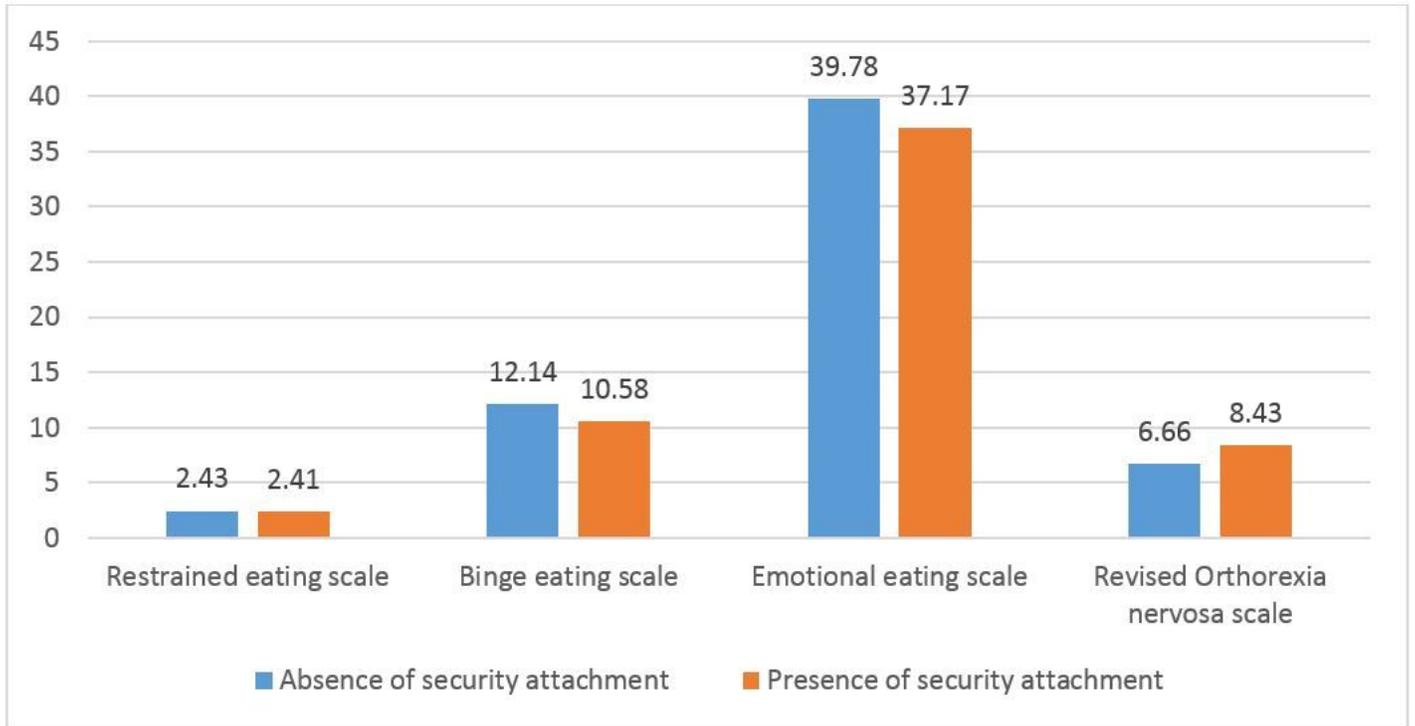


Figure 2

Mean scales scores in terms of absence/presence of a security attachment style P=0.001 for ORTO-R; p>0.05 for all other variables.

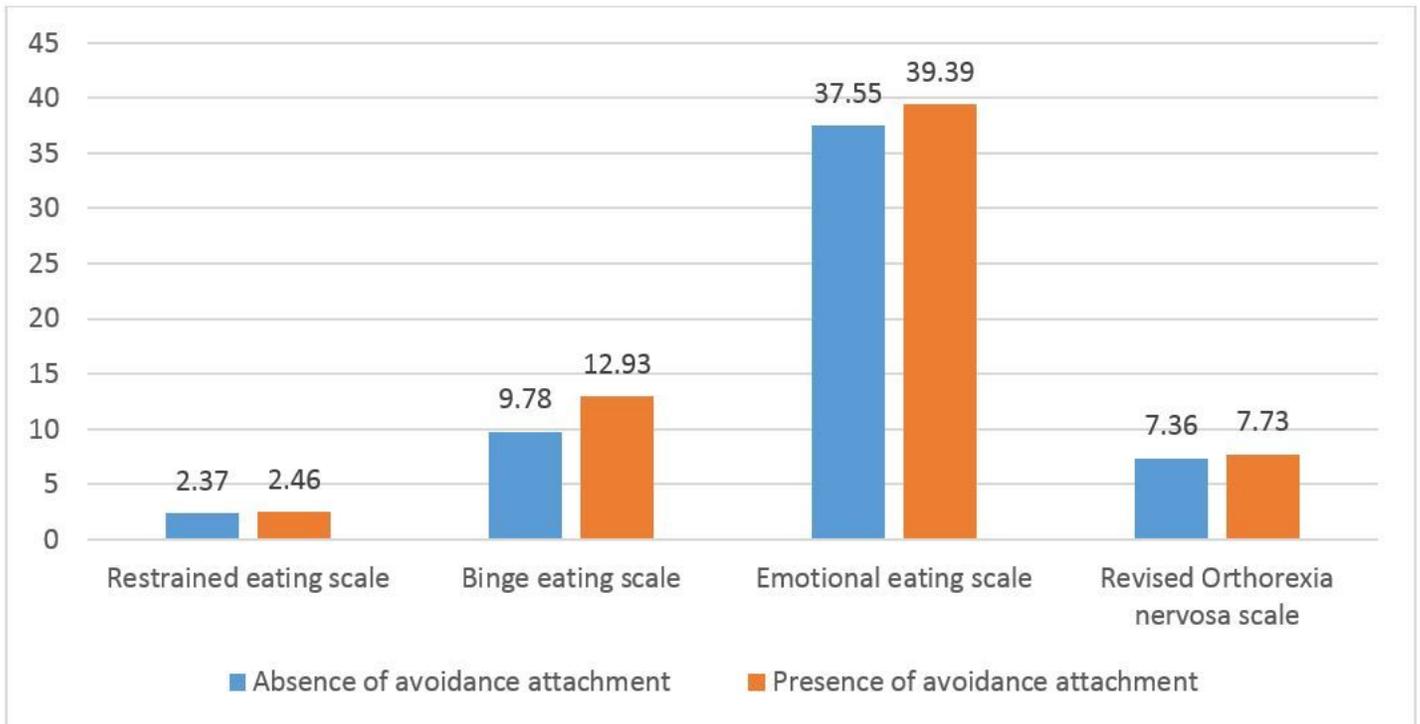


Figure 3

Mean scales scores in terms of absence/presence of an avoidance attachment style. P=0.002 for BES scale; p>0.05 for all other variables.

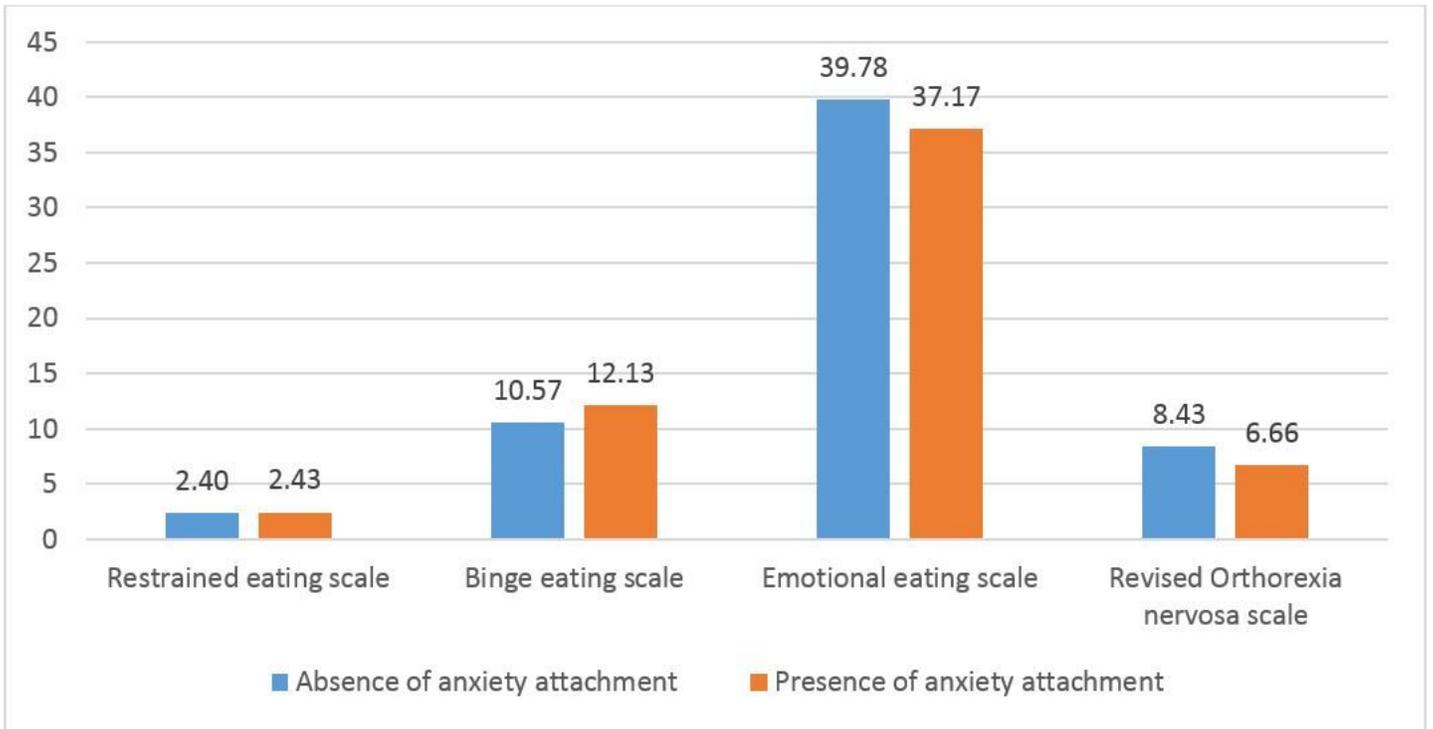


Figure 4

Mean scales scores in terms of absence/presence of an anxiety attachment style P=0.006 for RES; p<0.001 for BES, p=0.003 for EES; p>0.05 for ORTO-R.