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Affectionless control: A parenting style associated with obesity and binge eating disorder in adulthood

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Affectionless control: a parenting style associated with obesity in adulthood

Running head: Affectionless control associated with obesity

Abstract

Objective: Obesity is rising globally with a heavy health and economic burden. Early attachment experiences are relevant to the development of obesity. The purpose of this study was to investigate if parental care and attachment style experienced in childhood is associated with obesity, with or without binge eating disorder (BED), in adulthood.

Method: Parental style, personality traits, and psychopathology were assessed in 810 clinically referred adults with obesity, of whom 357 with BED and 453 without BED (non-BED), and 463 healthy subjects (HS). Assessments included the Parental Bonding Instrument, Temperament and Character Inventory, Eating Disorder Inventory-2, Symptom Checklist-90, and Beck Depression Inventory-II.

Results: Both BED and non-BED reported lower maternal and paternal care and higher overprotection than HS. BED reported worse levels of parental care than non-BED and HS. “Affectionless control” parenting style was more frequently reported by both BED and non-BED than HS. No significant differences in parenting style emerged between BED and non-BED.

Conclusions: Perception of parental “affectionless control” was associated with obesity in adults, and lower quality of parental care was more frequently reported by participants with BED. Parental style may constitute an important target for early interventions to prevent obesity.

Key words: obesity; binge-eating disorder; attachment; affectionless control; prevention

Highlights:

1. Perceived affectionless control is a specific parenting trait associated with obesity
2. Affectionless control in both parents was linked to a 9-fold greater risk of obesity
3. BED was not characterized by specific parental styles with respect to non-BED

Introduction

Obesity is a complex medical condition whose prevalence has been rising globally in the last decades, especially in the young (Abarca-Gómez et al., 2017). Because of its association with increased mortality and various comorbidities, including also psychiatric ones, obesity constitutes a major health concern in the general population with a considerable societal economic burden (Amianto, Lavagnino, Abbate-Daga, & Fassino, 2011). Treatment attempts involving lifestyle modifications and increased physical activity are often hampered by poor adherence and high drop-out rates (Miller & Brennan, 2015). Despite a number of studies investigating the possible link between obesity and psychiatric disorders, a precise understanding of the relationship of obesity with depression, schizophrenia, and anxiety disorders is incomplete (Avila et al., 2015; Preiss, Brennan, & Clarke, 2013). In particular, the relationship between obesity and eating disorders remains unclear. Obesity shares many psychological features with eating disorders, and especially with binge eating disorder (BED), which often accompanies obesity, but few studies have investigated the developmental characteristics of these conditions (Amianto, Ercole, Abbate Daga, & Fassino, 2016).

Early attachment experiences are considered relevant co-factors for the development of eating disorders and obesity later in life (Abbate-Daga, Gramaglia, Amianto, Marzola, & Fassino, 2010; Anderson & Keim, 2016; Bahrami, Kelishadi, Jafari, Kaveh, & Isanejad, 2013; Tasca & Balfour, 2014). Specifically, attachment insecurity appears to be related to the key features of these conditions. Excessive food intake and disordered eating are conceptualized by many authors as a way to cope with stress and negative emotions in a framework of internalized negative experiences (Faber, Dubé, & Knäuper, 2018; Kittel, Brauhardt, & Hilbert, 2015; Leehr et al., 2015). On the other hand, treatments that address attachment insecurity are associated with improvement in BED symptoms (Maxwell, Tasca, Ritchie, Balfour, & Bissada, 2014). Research on parenting have evidenced that non-authoritative styles are associated with increased risk of obesity in childhood, while authoritative style seems to be protective (Gartstein, Seamon, Thompson, & Lengua, 2018; Halliday, Palma, Mellor,

Green, & Renzaho, 2014; Kakinami, Barnett, Séguin, & Paradis, 2015; Sokol, Qin, & Poti, 2017). Furthermore, both physical and psychological abuse in childhood may play a role in favoring adult obesity by inducing mental and emotional perturbations, maladaptive coping responses, and stress-induced metabolic disturbances (Amianto et al., 2018; Ehlert, 2013).

The Parental Bonding Instrument (PBI) represents a validated instrument for a retrospective evaluation of parental care and overprotection during childhood and adolescence (Gordon Parker, Tupling, & Brown, 1979). Many studies have demonstrated that low levels of parental care and high overprotection are significantly associated with psychiatric conditions such as depression (Mannarini, Balottin, Palmieri, & Carotenuto, 2018), suicidality (Goschin, Briggs, Blanco-Lutzen, Cohen, & Galynker, 2013), anxiety (Giakoumaki et al., 2013) and personality traits (Takahashi, Suzuki, Matsumoto, Shirata, & Otani, 2017). A literature review including 24 studies applying the PBI to women with eating disorders evidenced that they were characterized by low parental care and high overprotection (Tetley, Moghaddam, Dawson, & Rennoldson, 2014). A study on obese participants showed that PBI can identify two clusters of obese patients: one group characterized by intermediate care and overprotection levels, and the other by low care and high parental overcontrol (Amianto, Ercole, et al., 2016). While the PBI scores of the first cluster bore little relation to psychopathology and personality measures, the second cluster showed more severe eating and general psychopathology and a personality profile characterized by more extreme traits.

Maternal and paternal styles may exert differential effects on the expression of psychopathology. For instance, maternal, but not paternal, overprotection has been associated with mood symptoms in adulthood (Heider, Matschinger, Bernert, Alonso, & Angermeyer, 2006). More recently, in adolescents, high maternal control was found to be related to higher risk for depressive, eating, anxiety, and behavioural disorders, while high paternal care was related to lower risk for social phobia, agoraphobia and alcohol abuse/dependence (Eun, Paksarian, He, & Merikangas, 2018). As it concerns EDs, there is less evidence of a differential relationships of maternal and

paternal parenting attitudes with eating psychopathology. However, the study by Grenon and coworkers (Grenon et al., 2016) in a large population of adult ED participants found low maternal care to have a direct effect on body dissatisfaction while low paternal care to have an indirect effect mediated by attachment anxiety and media internalization. Previous research has found that a parenting style characterized by a combination of low care and high overprotection was associated with schizotypy and anxiety (Giakoumaki et al., 2013), internalizing and externalizing symptoms (Mannarini et al., 2018) and high neuroticism (Takahashi et al., 2017).

To the best of our knowledge, no study has evaluated PBI-defined parenting styles in a large sample of obese subjects and examined their relation with clinical parameters, psychopathology and personality traits. A better understanding of their relationship could provide further insight into the possible developmental roots of obesity and associated psychopathology (Mazzeschi et al., 2014; Ong et al., 2018). Previous studies have found more personality abnormalities and psychopathology in obesity than in healthy controls (Amianto et al., 2011, 2016, 2018).

It is possible that one or more unhealthy maternal or paternal parenting styles, alone or in combination, are specifically related to BED, or to the clinical features (e.g. BMI), personality traits, and eating psychopathology expressed by obese participants.

The present study assessed a large sample of participants affected by obesity with binge-eating disorder (BED) or without it (non-BED) and compared them with non-obese healthy subject (HS) with the aims to: 1) confirm in a larger sample the association of obesity with lower levels of parental care and higher overprotection; and 2) explore the possible association of a specific maternal or paternal unhealthy parenting style, alone or in combination, with obesity, with or without BED.

Method

Participants

Eight-hundred-ten obese participants seeking treatment at the Regional Expert Centre for the Eating Disorder of the University of Torino, Italy, between January 2010 and September 2015, were enrolled in this study. All participants received a psychiatric evaluation to assess for possible presence of eating disorders using the Structured Clinical Interview for Diagnosis (SCID) for DSM-IV-TR, a tool that has fair to excellent inter-rater reliability for axis I and excellent reliability for axis II diagnoses. Inclusion criteria for the study were: 1) age between 18 and 60 years; 2) obesity of > 2 year duration; 3) no intellectual disability, developmental or learning disorder; 4) no psychosis or neurological disorder (e.g., multiple sclerosis, stroke); 5) no history of dementia or severe head trauma; 6) no current substance abuse. Of the 810 participants with obesity, 357 (333 females and 24 males) met criteria for with BED. The non-BED group included 453 participants (400 females and 53 males).

The control group consisted of 463 healthy subjects (HS) (380 females and 83 males), randomly selected from a database of the Department of Neurosciences-Psychiatry Section, on the basis of the same entry criteria as the patients, except for obesity, with age range from 18 to 60 years. HS had been screened to rule out psychiatric disorders, intellectual disability, developmental or learning disorders, or neurological disorders (e.g., multiple sclerosis, stroke), history of dementia or severe head trauma at recruitment.

Ethics

The study was approved by the Ethics Committee of AOU City of Science and Health, Turin (protocol number: CS2 366). All participants provided written informed consent to take part in the

study. All the procedures were conducted according to the 1995 Declaration of Helsinki as revised in Edinburgh in 2000.

Materials

All the participants were administered the same battery of psychometric tests including:

The Temperament and Character Inventory (TCI), which provides a clinical classification of different personality traits according to the Cloninger model (Cloninger, Svrakic, & Przybeck, 1993). It includes four temperament subscales: Novelty Seeking, Harm Avoidance, Reward Dependence, Persistence, and three character subscales: Self-directedness, Cooperativeness, Self-transcendence. Each dimension is represented by sub-dimensions which better specify the meaning of the scale, nevertheless for the aims of the present research only main dimensions were used. Concerning reliability and validity, its psychometric properties support its clinical usefulness in the assessment of personality psychopathology (Fossati et al., 2007). Cronbach's alpha for Italian Version = 0.72

The Eating Disorder Inventory-2 (EDI-2), a self-administered 91-item questionnaire that evaluates symptoms and characteristics typical of eating disordered patients (Garner, 1991). It consists of 11 scales: Drive to Thinness, Bulimia, Body Dissatisfaction, Inadequacy, Interpersonal Distrust, Perfectionism, Asceticism, Interoceptive Awareness, Impulsiveness, Social Insecurity, and Maturity Fears. All the scales were applied in the present research. Cronbach's alpha for Italian Version = 0.81

The Symptom Checklist-90 (SCL-90), a self-administered questionnaire aimed at the evaluation of psychopathology (Derogatis, Rickels, & Rock, 1976). It is composed of 9 scales, Somatization, Obsessive-Compulsiveness, Depression, Anxiety, Phobic Anxiety, Interpersonal Sensitivity, Hostility, Psychoticism, Paranoid Ideation, whose scores generate a Total Score. All the scales were applied in the present research. Its psychometric characteristics have been validated for assessing the psychopathological profile (Lara, de Santillana, De La Cárdenas, Focil, & Cavazos, 2005). Cronbach's alpha for Italian Version = 0.96

The Beck Depression Inventory-II (BDI-II), a self-administered questionnaire that scores depressive symptoms and is widely used to assess the severity of depression (Beck, Steer, & Brown, 1996). It comprises two subscales, for cognitive and somatic symptoms, whose sum produces a total score. Only the total scale was applied in the present research. Cronbach's alpha for Italian Version = 0.89

The Parental Bonding Instrument (PBI) is a questionnaire comprised of two scales, termed 'care' and 'overprotection' or 'control', which measure basic parental styles as perceived by the subject (Gordon Parker et al., 1979). Parenting styles are distinguished in: low/high maternal care, low/high maternal overprotection, low/high paternal care and low/high overprotection. The psychometric properties of PBI have been extensively evaluated, and it has demonstrated good test-retest reliability, internal consistency, and validity (Wilhelm, Niven, Parker, & Hadzi-Pavlovic, 2005). According to Parker (Parker, 1989), four different parenting styles can be identified for each parent:

- Neglectful parenting (low care + low overprotection)
- Affectionless control (low care + high overprotection)
- Affectionate constraint (high care + high overprotection)
- Optimal parenting (high care + low overprotection)

Based on these styles, there can be 16 possible combinations of maternal and paternal style (for details, see Table 5). Cronbach's alpha for Italian Version = 0.81

Procedure

All participants (both patients and healthy participants) followed the same procedure. The first visit was for a clinical evaluation and measurement of anthropometric parameters, including weight and height, and body mass index (BMI) calculation. All participants were given the same battery of psychometric tests investigating personality and psychopathology characteristics, which were completed at home and then returned to the researchers at a second meeting.

Statistical analyses

ANOVA was applied to compare the participant groups (BED, non-BED, and HS), continuous variables (age, education) among the the χ^2 test was applied to compare gender distribution. A post hoc analysis with Tukey's HSD was applied. The homogeneity of variance was tested with the Levene's test. ANCOVA was applied to the personality and psychopathology scales using as covariates the sociodemographic characteristics which differed between groups. A post hoc analysis with Tukey's HSD was then applied. Statistical significance was set at $p \leq 0.001$ to avoid type I errors due to the high number of comparisons.

The three groups of participants (non-BED, BED and HS) were clustered into four subgroups based on their maternal and paternal parenting style, and in sixteen subgroups based on "parental couples". The distribution of maternal and paternal parenting styles, and of parental couple style in each group was tested using the χ^2 test. The Odds Ratio (OR) was calculated for each parenting style, separately for each group.

Data analyses were performed with the IBM SPSS Statistics 21.0 (IBM Corporation, Armonk, New York).

Results

Demographics and clinical characteristics

As reported in Table 1, statistically significant differences were present between BED, non-BED and HS regarding age, BMI and binge episodes. BED and non-BED had a higher mean age than HS. No between-group difference was found in sex distribution and age of onset of obesity. Both BED and non-BED displayed higher BMI than HS. Non-BED had higher BMI than BED. BED displayed higher frequency in binge-eating episodes.

[Table 1]

Personality and psychopathological characteristics of the sample

Both BED and non-BED reported significantly lower maternal care, higher maternal overprotection, lower paternal care and higher paternal overprotection when compared to HS. BED also reported lower maternal and paternal care than non-BED (Table 2). Both BED and non-BED displayed higher harm avoidance, reward dependence, self-transcendence, and lower persistence and self-directedness than HS. BED also reported higher harm avoidance and lower self-directedness than non-BED (Table 2).

Both BED and non-BED subgroups showed significant higher levels of eating psychopathology on EDI-2 than HS. BED showed also higher perfectionism, fear of maturity, and ineffectiveness than non-BED. BED had higher levels of psychopathology on all the SCL-90 subscales than HS and non-BED (Table 3).

[Table 2]

[Table 3]

Maternal and paternal parenting style distribution among groups

Maternal affectionless control was significantly more common, and maternal optimal parenting and affectionate constraint less common in BED and non-BED than in HS (Table 4). Paternal affectionless control was significantly more common, and paternal optimal parenting less common in BED and non-BED with respect to HS (Table 4).

[Table 4]

Couple parenting style distribution among groups

Among couple parenting styles, the following displayed significant between-group differences: maternal neglectful and paternal affectionless control ($\chi^2=6.82$, $df=2$; $p<0.033$), maternal affectionate constraint and paternal affectionless control ($\chi^2=6.58$, $df=2$; $p<0.037$), maternal affectionless control and paternal affectionate constraint ($\chi^2=21.14$, $df=2$; $p<0.000$), maternal and paternal affectionless control ($\chi^2=124.14$, $df=2$; $p<0.000$) were more common among BED and non-BED with respect to HS. Maternal affectionate constraint and paternal optimal parenting ($\chi^2=24.30$, $df=2$; $p<0.000$), maternal optimal parenting and paternal neglectful parenting ($\chi^2=17.38$, $df=2$; $p<0.000$), maternal and paternal optimal parenting ($\chi^2=136.84$, $df=2$; $p<0.000$) were more common in HS with respect to BED and non-BED participants (Fig 1).

[Figure 1]

ODDS RATIO for single parent and couple parenting styles

The OR between BED and HS evidences the highest association for BED with paternal (OR = 6.39) and maternal (OR = 5.48) affectionless control and with combined maternal and paternal affectionless control parenting style (OR = 8.68). Other OR >1.5 are shown in table 5.

The OR between non-BED and HS evidences the highest relative risk for non-BED concerning maternal (OR = 4.57) and paternal (OR = 4.93) affectionless control parenting styles, and combined maternal and paternal affectionless control (OR = 6.63), maternal affectionless

control and paternal affectionate constraint (OR = 3.40), and maternal neglectful and paternal affectionless control (OR = 2.85) parenting styles. Other significant OR (1.5) were shown in table 5.

The OR between BED and non-BED evidenced the higher relative risk for BED concerning combined maternal neglectful and paternal optimal (OR = 1.71), maternal and paternal optimal (OR = 1.60), and maternal affectionate constraint and paternal optimal (OR = 1.60) parenting styles.

The OR between obese participants (BED+non-BED) and HS evidenced the highest relative risk for obese participants concerning maternal (OR = 4.95) and paternal (OR = 5.53) affectionless control parenting styles, and combined maternal and paternal affectionless control (OR = 7.48), and maternal and paternal affectionless control and paternal affectionless constraint (OR = 3.12) parenting styles.

[Table 5]

Discussion

Consistent with previous findings (Takahashi et al., 2017), BED and non-BED showed lower maternal and paternal care and higher overprotection compared with healthy participants, confirming the literature that supports the role of attachment in the pathogenesis of obesity (Abbate-Daga, Gramaglia, Amianto, Marzola, & Fassino, 2010; Anderson & Keim, 2016; Bahrami, Kelishadi, Jafari, Kaveh, & Isanejad, 2013; Tasca & Balfour, 2014). As evidenced in the previous study by Amianto and coworkers (2016), BED participants reported having received worse levels of maternal and parental care than non-BED. This finding may suggest that particularly low levels of care are specifically associated to the BED psychopathology, and supports the evidence of a the positive effects of therapies that are based on attachment in BED (Maxwell, Tasca, Ritchie, Balfour, & Bissada, 2014).

Moreover, according to previous reports, both BED and non-BED displayed worse personality profile, with higher harm avoidance, lower reward dependence, persistence and self-directedness and worse eating and general psychopathology than HS (Amianto, Ercole, et al., 2016). In particular, BED display higher scores in harm avoidance, and lower in reward dependence, and self-directedness, and worse psychopathology with respect to both non-BED and HS. These data support the conclusion that the binge eating disorder shares with many other mental disorders a “core” personality profile related, on one hand, to less caring parenting, and, on the other hand, to greater psychopathology expression (Fassino et al., 2013). Moreover, as suggested by previous literature, severity of BED psychopathology may be related to the degree of attachment problems (Caroleo et al., 2018; Otani, Suzuki, Matsumoto, Enokido, & Shirata, 2016; Takahashi et al., 2017). Future research may test the mediating role of personality traits in attachment and psychopathology expression.

Combined parenting styles

Adding to previous evidence the present research outlined the specific relevance of the parenting style defined as “affectionless control” (Parker, 1989). The analysis of the combined parenting style better defines the parenting mechanism which may be relevant for the development of obesity. Neither parental neglect, nor parental overcontrol alone increases the risk of obesity, as it could have been derived by previous research (Amianto, et al., 2016). The affectionless control represents a specific combination of these parenting attitudes, and, in particular, is a parenting style which refers to parents who are unresponsive to their child’s needs for care while at the same time do not foster appropriate independence, thus creating an anxious attachment. Literature suggest that this specific parenting style is associated with higher neuroticism and represents a possible risk factor for depression and altered expression of glucocorticoid receptor, both possibly related to the pathogenesis of obesity (Avila et al., 2015; Preiss et al., 2013; Takahashi et al., 2017).

Affectionless control has been shown to be a risk factor for the development of EDs, and it may represent a common liability for different eating problems (e.g. anorexia or bulimia nervosa) which apparently do not share a common pathogenesis (Monteleone et al., 2019). Indeed, this form of attachment impairs the development of positive working models of the Self-identity, which is highly relevant to ED pathogenesis (Tasca & Balfour, 2014). As theorized for other EDs, also obesity may represent the consequence of a failure, at least partial, in the development of a coherent Self (Self-awareness and Self-regulation, in particular), in relation to altered attachment dynamics (Amianto, Northoff, Daga, Fassino, & Tasca, 2016). Consistently with the model recently proposed by Scalabrini and coworkers (Scalabrini, Mucci, & Northoff, 2018), the alteration of the early attachment dynamics produces a defective maturation of the brain areas implied in the construction of the sense of the self. The altered eating functioning would overcompensate the lack of Self-boundaries. In anorexia nervosa and obesity this may happen in opposite directions with divergent clinical results. This would be consistent with the evidence that obesity often precedes or follows anorexia nervosa (Murray et al., 2017). On the other hand, affectionless control, even when expressed

by only one parent, is strongly associated to obesity, regardless of the presence of BED. This supports a specific role of affectionless control in the pathogenesis of obesity, regardless of the presence of eating psychopathology (Amianto, Ercole, et al., 2016; Amianto, Northoff, Abbate Daga, Fassino, & Tasca, 2016; Faber et al., 2018).

According to some reports (Amianto, Northoff, et al., 2016; Hymowitz, Salwen, & Salis, 2017), two different pathogenic pathways can be proposed for ED symptoms: one leading to extreme weight alteration, like in anorexia nervosa or obesity, and the other resulting in binge-eating symptoms and thus conducing to binge-purging anorexia nervosa, bulimia nervosa, and binge-eating disorder. The first pathway could be more related to the defective construction of the sense of self, the second to conflicts in relationships (Amianto et al., 2012). Future research and clinical approaches should explore and validate this hypothesis to inform psychological treatments.

The association of affectionless control with obesity is significantly greater if both parents display this parenting style. Instead, if only parent shows it, the risk for obesity is significantly lower. This means that, even if affectionless control by one parent is a risk factor in childhood, this can be attenuated if the other parent has a different, although non optimal, parenting style. These data further underscore the specific association of affectionless control with the development of obesity, while providing evidence of a potential protective effect within the parental couple. This has treatment implications.

Parental styles associated with BED

Against expectations, we found no evidence of a strong association of a particular parenting style with BED. BED is the psychopathological condition most frequently associated with obesity and involves a higher level of psychological suffering than obesity alone (Amianto et al., 2016, 2018; Kessler, Hutson, Herman, & Potenza, 2016). The absence of a relationship between affectionless control and BED implies that, even though related to obesity, this parenting style alone is not related

to high levels of psychological suffering in obese subjects, and may only be influential on their unhealthy eating attitudes. Moreover it may also suggest that, even though BED participants reported a particularly low care from both parents, their attachment problems may only be indirectly involved in the pathogenesis of the BED.

The combination of maternal neglectful parenting with paternal optimal parenting was associated with the highest relative risk for BED, while maternal affectionate constraint alone had a protective effect. Although with low strength, this evidence coupled with lower levels of maternal and paternal care in BED, is consistent with previous literature suggesting a role of parental neglect in the pathogenesis of BED like in many other psychiatric conditions (Amianto, Ercole, et al., 2016; Mannarini et al., 2018; Sokol et al., 2017).

Clinical implications

A recent review by Kaplan and Milstein suggests that the healthcare system in the US accounts for a very low rate of population life expectancy, instead a large influence is exerted by habits and culture (Kaplan & Milstein, 2019). Recent evidence points out that dietary factors contribute to a large share of deaths and loss of disability adjusted life years (DALYs) worldwide and that the prevention of obesity in childhood has often focused on nutritional psychoeducation (The Lancet Public Health, 2019). Parenting attitudes represent mainly a cultural factor, influenced by acculturation and psychoeducation: prevention of the epidemics of obesity should promote also healthy parenting styles in addition to nutritional styles (Chu et al., 2018). The present research suggests that interventions targeted to improving parenting styles in childhood and focused on correcting affectionless control may be effective in preventing obesity.

Current obesity in both BED and non-BED is related to affectionless control parenting style expressed by one of both parents. No evidence supports that the BED may be related to a specific parenting style. This suggests to build different and specific care protocols for each target symptom

differentiating obese patients with a diagnosis of obesity only from those with the BED too (Saltzman & Liechty, 2016). The adoption of a different theoretical framework for conceiving the psychopathology of obesity may include the connection between the early attachment dynamics and the development of the sense of the self, as for anorexia nervosa. This may help clinicians and psychotherapists to overcome the current difficulties (e.g. high dropout rate) and the low efficacy with respect to the psychological treatment of obesity (Amianto, Northoff, et al., 2016; Amianto et al., 2019).

Limitations

This was a cross-sectional study that used a self-administered retrospective instrument, and recall biases cannot be excluded, in particular among the most suffering participants. Definitive causality in the association between past attachment characteristics and current clinical/psychopathological conditions cannot be established, even if the temporal sequence implicit in the assessment procedure is suggestive of a direction from infancy parenting to current clinical, personality and psychopathology conditions. Cohort studies are needed to confirm possible causal effects. Even though the overall sample is large, the statistical power of the group comparison was reduced when it was divided into the 16 subgroups of parenting couples, thus the results should be replicated on larger samples. Finally, the obese population is large and heterogeneous, and our study was conducted in a center for the care of eating disorders, so the sample is not necessarily representative of obesity in the general population, but is most relevant to clinically referred patients, who are probably also the most serious.

Conclusion

Notwithstanding the abovementioned limitations this study provides the first strong indicator of an association between a specific parenting style in childhood and development of obesity in adulthood. Efforts to prevent obesity should take into account dysfunctional parental styles in

childhood and implement efforts to correct them. This may elicit a consistent cultural change to adapt the parenting attitudes and respond to the needs of children in view of the rapid evolution of current society. Future researches should be addressed to explore the efficacy of these efforts.

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Table 1. Demographic and clinic characteristics of the sample

	BED (a) n=357	Non-BED (b) n=453	HS (c) n=463			
	mean ± sd	mean ± sd	mean ± sd	F	p	Post hoc
Age	41.74 ± 12.30	43.34 ± 12.83	34.54 ± 17.18	45.53	.000	a, b > c
Binge episodes/per week	3.78 ± 2.44	0.94 ± 0.123	-	312.02	.000	-
BMI	38.06 ± 6.61	39.49 ± 6.78	20.384 ± 3.66	962.41	.000	b > a > c
	n (%)	n (%)	n (%)	χ^2	P	
Gender						
<i>Male</i>	24 (6.7)	53 (11.7)	83 (17.9)	4.45	.245	
<i>Female</i>	333 (93.7)	400 (88.3)	380 (82.1)			
Obesity Onset						
<i>Childhood</i>	83 (23.2)	87 (19.2)	-	3.14	.371	
<i>Adolescence</i>	108 (30.2)	133 (29.4)	-			
<i>Pregnancy</i>	44 (12.3)	75 (16.5)	-			
<i>Adulthood</i>	124 (34.7)	158 (34.9)	-			

Note: BED = obese patients with Binge Eating Disorder; Non-BED = obese patients without Binge Eating Disorder; HS = healthy subjects; BMI = Body Mass Index.

Table 2. Personality and parenting characteristics of the sample*

	BED (a) n= 357 mean ± sd	Non-BED (b) n=453 mn ± sd	HS (c) n=463 mean ± sd	F	p	Post hoc
TCI						
Harm Avoidance	23.8 ± 6.35	21.36 ± 6.67	17.48 ± 6.91	95.14	.000	a > b > c
Reward Dependence	15.10 ± 3.64	15.19 ± 3.70	14.41 ± 4.65	4.84	.008	b > a > c
Persistence	4.12 ± 1.90	4.17 ± 1.72	5.29 ± 3.76	26.31	.000	c > a, b
Self-Directness	20.90 ± 8.19	24.34 ± 8.49	29.51 ± 7.86	114.82	.000	c > b > a
Self-transcendence	14.21 ± 6.12	14.31 ± 5.94	11.48 ± 6.67	28.88	.000	b, a > c
PBI						
Maternal Care	20.63 ± 9.94	22.25 ± 9.85	28.89 ± 7.68	97.87	.000	c > b > a
Maternal Overprotection	19.14 ± 8.83	18.61 ± 8.87	13.29 ± 7.99	62.20	.000	a, b > c
Paternal Care	18.92 ± 10.31	21.13 ± 10.34	25.76 ± 9.06	52.24	.000	c > b > a
Paternal Overprotection	17.93 ± 9.24	16.79 ± 9.29	9.65 ± 8.21	109.63	.000	a, b > c

Note: BED = obese patients with Binge Eating Disorder; Non-BED = obese patients without Binge Eating Disorder; HS = healthy subjects;

TCI = Temperament and Character Inventory; PBI = Parental Bonding Instrument.

**ANCOVA with age, number of binge episodes, BMI as covariates*

Table 3. Psychopathological characteristics of the sample *

	BED (a) n=357 mean ± sd	Non-BED (b) n=453 mean ± sd	HS (c) n=463 mean ± sd	F	p	Post hoc
EDI-2						
Drive for Thinness	12.15 ± 5.66	10.42 ± 5.73	2.47 ± 3.99	361.17	.000	a > b > c
Bulimia	8.75 ± 5.47	5.10 ± 4.93	1.65 ± 2.98	214.16	.000	a > b > c
Body Dissatisfaction	19.72 ± 6.20	18.54 ± 6.48	6.00 ± 6.31	536.66	.000	a > b > c
Ineffectiveness	10.72 ± 7.13	7.80 ± 6.62	2.89 ± 3.91	152.89	.000	a > b > c
Perfectionism	4.99 ± 3.85	4.33 ± 3.58	4.26 ± 3.24	4.68	.009	a > b, c
Interpersonal Distrust	6.05 ± 4.54	5.03 ± 4.15	3.01 ± 3.02	55.27	.000	a > b > c
Interoceptive Awareness	9.55 ± 6.31	6.99 ± 5.85	2.50 ± 3.40	159.99	.000	a > b > c
Maturity Fears	6.30 ± 4.81	6.06 ± 4.97	4.05 ± 3.95	26.71	.000	a, b > c
Ascetism	7.26 ± 4.02	6.07 ± 3.71	3.22 ± 2.26	133.68	.000	a > b > c
Impulse Regulation	6.03 ± 5.49	4.92 ± 5.37	2.28 ± 3.01	58.96	.000	a > b > c
Social Insecurity	7.77 ± 4.58	6.14 ± 4.54	3.70 ± 3.64	82.34	.000	a > b > c
SCL-90						
Somatization	21.93 ± 9.95	19.09 ± 10.13	7.40 ± 5.69	316.21	.000	a > b > c
Obsessive-Compulsive	18.41 ± 9.10	14.64 ± 8.99	7.58 ± 5.50	190.35	.000	a > b > c
Interpersonal Sensitivity	16.09 ± 8.18	12.82 ± 8.36	6.70 ± 5.54	164.35	.000	a > b > c

Depression	25.73 ± 11.00	20.18 ± 12.02	8.60 ± 6.81	296.68	.000	a > b > c
Anxiety	15.85 ± 8.38	12.49 ± 8.29	6.22 ± 4.83	179.48	.000	a > b > c
Hostility	7.22 ± 5.03	6.25 ± 5.01	2.86 ± 2.57	114.31	.000	a > b > c
Phobic Anxiety	6.32 ± 5.37	4.75 ± 5.12	1.83 ± 2.81	100.47	.000	a > b > c
Paranoid Ideation	9.10 ± 5.49	7.65 ± 4.90	3.72 ± 2.98	153.26	.000	a > b > c
Psychoticism	10.85 ± 7.18	8.24 ± 7.27	5.54 ± 13.66	27.80	.000	a > b > c
Total	141.95 ± 61.64	114.90 ± 64.97	50.65 ± 34.84	291.52	.000	a > b > c
BDI-II						
Total score	18.95 ± 10.64	15.89 ± 11.01	5.89 ± 5.40	109.23	.000	a > b > c

Note: BED = obese patients with Binge Eating Disorder; Non-BED = obese patients without Binge Eating Disorder; HS = healthy subjects; EDI-2 = Eating Disorder Inventory-2; SCL90 = Symptom Checklist-90; BDI-II = Beck Depression Inventory II.

**ANCOVA with age, number of binge episodes, BMI as covariates*

Table 4. Distribution and chi-square test of PBI parenting clusters among participants' groups

	Neglectful	Affectionless Control	Affectionate Constraint	Optimal
	n (%)	n (%)	n (%)	n (%)
Maternal Parenting				
BED	47 (13.2)	202 (56.6)	49 (13.7)	59 (16.5)
Non-BED	56 (12.4)	236 (52.1)	81 (17.9)	80 (17.7)
HS	43 (9.3)	89 (19.2)	102 (22)	229 (49.5)
χ^2	3.54	149.16**	9.38*	149.68**
Paternal Parenting				
BED	54 (15.1)	179 (50.1)	66 (18.5)	58 (16.2)
Non-BED	63 (13.9)	198 (43.7)	95 (21.0)	97 (21.4)
HS	83 (17.9)	63 (13.6)	80 (17.3)	237 (51.2)
χ^2	2.92	144.95**	2.10	144.52**

Note: BED = obese patients with Binge Eating Disorder; Non-BED = obese patients without Binge Eating Disorder; HS = healthy subjects.

***p<0.000; * p<0.01*

Table 5. ODD ratio (OR) of different PBI maternal, paternal and combined clusters between participants' groups

PBI sub-scales	BED/HS	Non-BED/HS	BED/Non-BED	BED + Non-BED/HS
	OR [95%CI]	OR [95%CI]	OR [95%CI]	OR [95%CI]
Parent				
Maternal neglectful parenting	1.48 [0.95 – 2.30]	1.38 [0.90 – 2.10]	0.93 [0.61 – 1.40]	1.42 [0.98 – 2.07]
Maternal affectionless control	5.48 [4.01 – 7.48]***	4.57 [3.40 – 6.14]**	0.84 [0.63 – 1.10]	4.95 [3.79 – 6.48]**
Maternal affectionate constraint	0.56 [0.39 – 0.81]	0.77 [0.56 – 1.07]	1.37 [0.93 – 2.01]	0.68 [0.51 – 0.90]
Maternal optimal parenting	0.21 [0.14 – 0.28]	0.22 [0.16 – 0.30]	1.08 [0.75 – 1.57]	0.21 [0.16 – 0.27]
Paternal neglectful parenting	0.82 [0.56 – 1.19]	0.74 [0.52 – 1.06]	0.91 [0.61 – 1.34]	0.77 [0.57 – 1.05]
Paternal affectionless control	6.39 [4.56 – 8.94]***	4.93 [3.56 – 6.82]**	0.77 [0.58 – 1.02]	5.53 [4.10 – 7.46]***
Paternal affectionate constraint	1.09 [0.76 – 1.56]	1.27 [0.91 – 1.77]	1.17 [0.82 – 1.66]	1.19 [0.88 – 1.60]
Paternal optimal parenting	0.19 [0.13 – 0.26]	0.26 [0.19 – 0.35]	1.41 [0.98 – 2.01]	0.26 [0.17 – 0.29]
Couple				
Maternal & paternal neglectful parenting	1.46 [0.84 – 2.75]	1.31 [0.66 – 2.61]	0.78 [0.41 – 1.49]	1.47 [0.80 – 2.70]
Maternal neglectful parenting & paternal affectionless control	2.86 [1.15 – 7.08]*	2.85 [1.19 – 6.85]*	0.99 [0.50 – 1.99]	2.85 [1.25 – 6.49]*
Maternal neglectful parenting & paternal affectionate constraint	1.96 [0.55 – 7.00]*	0.76 [0.17 – 3.44]	0.39 [0.10 – 1.57]	1.29 [0.39 – 4.21]
Maternal neglectful parenting & paternal optimal parenting	0.53 [0.21 – 1.28]	0.90 [0.44 – 1.82]	1.71 [0.69 – 4.25]*	0.73 [0.38 – 1.39]
Maternal affectionless control & paternal neglectful parenting	0.94 [0.49 – 1.82]	1.02 [0.56 – 1.87]	1.09 [0.56 – 2.10]	0.99 [0.58 – 1.69]
Maternal & paternal affectionless control	8.68 [5.62 – 13.38]***	6.63 [4.33 – 10.14]***	0.76 [0.60 – 1.02]	7.48 [4.10 – 11.2]***

Maternal affectionless control & paternal affectionate constraint	2.76 [1.52 – 5.03]	3.40 [1.94 – 5.98]**	1.23 [0.78 – 1.95]	3.12 [1.82 – 5.31]**
Maternal affectionate constraint & paternal neglectful parenting	1.06 [0.44 – 2.59]	1.02 [0.44 – 2.38]	0.96 [0.39 – 2.35]	1.04 [0.49 – 2.19]
Maternal affectionate constraint & paternal affectionless control	1.53 [0.70 – 3.36]*	2.38 [1.19 – 4.76]*	1.55 [0.80 – 3.01]*	2.01 [1.04 – 3.85]*
Maternal & paternal affectionate constraint	0.42 [0.39 – 0.46]	0.48 [0.45 – 0.51]	1.20 [0.65 – 2.20]	0.62 [0.60 – 0.65]
Maternal affectionate constraint & paternal optimal parenting	0.22 [0.10 – 0.49]	0.36 [0.20 – 0.64]	1.60 [0.68 – 3.78]*	0.29 [0.18 – 0.50]
Maternal optimal parenting & paternal neglectful parenting	0.35 [0.17 – 0.72]	0.30 [0.15 – 0.60]	0.86 [0.36 – 2.06]	0.32 [0.19 – 0.57]
Maternal optimal parenting & paternal affectionless control	1.31 [0.71 – 2.45]	1.12 [0.61 – 2.06]	0.53 [0.26 – 1.08]	1.21 [0.71 – 2.06]
Maternal optimal parenting paternal & affectionate constraint	0.43 [0.19 – 0.99]	0.56 [0.28 – 1.13]	1.29 [0.53 – 3.14]	0.51 [0.28 – 0.93]
Maternal & paternal optimal parenting	0.13 [0.08 – 0.21]	0.21 [0.14 – 0.30]	1.60 [0.94 – 2.72]*	0.17 [0.12 – 0.24]
Maternal affectionless control & paternal optimal parenting	1.25 [0.71 – 2.05]	1.08 [0.61 – 1.90]	0.45 [0.20 – 1.01]	1.24 [0.71 – 1.98]

Note: OR = Odd Ratio; BED = patients with Binge Eating Disorder; Non-BED = obese patients without Binge Eating Disorder; HS= healthy subjects.
 In bold: *OR>1.5; **:OR>3; ***:OR>4.5.

Figure 1.

Title: Distribution of the parenting styles among BED, non-BED, and Healthy Subjects groups

Legend:

The Figure1 presents the distribution of the parenting styles among BED, non-BED, and Healthy Subjects groups and the significance of the chi-square comparison. The number after each column indicates the absolute number of subjects, the X axis presents the percentage. Here follows the description of the abbreviation used for each parenting style: M1= maternal neglectful parenting; M2 = maternal affectionless control; M3 = maternal affectionate constraint; M4 = maternal optimal parenting; P1 = paternal neglectful parenting; P2 = paternal affectionless control; P3 = paternal affectionate constraint; P4 = paternal optimal parenting. ** p<0.001; *p<0.05.