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Abstract

Objective: This study aimed to examine whether there is an association between individual, social and family influences and dysfunctional eating patterns early in life and the likelihood of developing a subsequent underweight eating disorder (ED) or obesity. Method: The total sample comprised 152 individuals (underweight ED, n= 45; obese patients, n= 65; healthy controls; n= 42) from Barcelona, Spain. The Cross-Cultural Questionnaire (CCQ) was used to assess early eating influences as well as individual and family eating patterns and attitudes towards food. Results: Even though a few shared eating influences emerged for both groups, unique factors were also observed. Whereas relationship with friends, teasing about eating habits by family members and the mass media were of specific relevance to the underweight ED group, the patient's own physical appearance, body dissatisfaction, teasing about eating habits by friends, teasing about body shape by family members and dysfunctional eating patterns were unique to obesity. Conclusions: Overlapping environmental risk factors provide evidence for integral prevention and intervention approaches that simultaneously tackle a range of weight-related problems. The unique factors might be important for targeting high-risk individuals.

Keywords: eating disorders; anorexia nervosa; EDNOS; obesity; individual and family eating patterns; eating influences

Introduction

Numerous interrelated risk factors have been implicated in the development of eating disorders (EDs) (Jacobi et al., 2011; Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004) and obesity (Ogden, Lamb, Carroll, & Flegal, 2010). Besides genetic and metabolic factors, the rapid increase in the prevalence of both dis- orders, in specific obesity, implicates personal, behavioural and socio-environmental factors as the primary driving force responsible for these troublesome epidemics (Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007; Neumark-Sztainer, Wall, Haines, Story, Sherwood, et al., 2007; Stice, Presnell, Shaw, & Rohde, 2005). Furthermore, both EDs and obesity have shown adverse health outcomes, comprising weight-related teasing, mal- adaptive weight control practices, body dissatisfaction, social iso- lation and low self-esteem (Gunnard et al., 2011; Krug et al., 2012; McClure, Tanski, Kingsbury, Gerrard, & Sargent, 2010; Neu- mark-Sztainer, Wall, Story, & Standish, 2012).

Even though EDs and obesity are generally studied and treated as independent disorders, some epidemiological studies have identified risk and protective factors common to both diseases (Neumark-Sztainer, 2009; Waaddegaard, Davidsen, & Kjoller, 2009). Research on EDs and obesity postulates childhood overweight as one of the most relevant factors for suffering these pathologies during adulthood (Brisbois, Farmer, & McCargar, 2011; Villarejo et al., 2012). Evidence also indicates that early problematic eating patterns are associated with EDs (Micali et al., 2007; Micali et al, 2011) and obesity (Han, Lawlor, & Kimm, 2010; Mitchell, Catenacci, Wyatt, & Hill, 2011) later in life. Moreover, research has indicated that the parents' attitudes and behaviours towards food (e.g. in the form of controlling the food environment and/or operating as models for eating) and weight are predictive of later ED problems (Fernandez-Aranda et al., 2007; Krug et al., 2009) and obesity (Cromley, Neumark-Sztainer, Story, & Boutelle, 2010; Scaglioni, Salvioni, & Galimberti, 2008).

A comparison to distinguish overlapping and specific risk factors between the ED and obesity literature can be difficult because of discrepancies across study designs, samples, diagnostic procedures and risk measures (Neumark-Sztainer, 2009; Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007; Neumark-Sztainer, Wall, Haines, Story, Sherwood, et al., 2007). Some of these shortcomings could be tackled by assessing risk and protective factors for different weight-related conditions within the same study. To our knowledge, no previous study has yet assessed whether early individual and family eating patterns and attitudes towards food as well as eating influences are shared or distinctive factors in extreme weight

conditions such as underweight ED patients and obesity by investigating both disorders concurrently. Such an approach is important for the development of integral prevention and interven- tion programmes, which might result effective for a spectrum of weight-related problems (Cromley, et al., 2010; Haines & Neumark-Sztainer, 2006; Irving & Neumark-Sztainer, 2002).

Aims of the study

The aims of the current study were to examine whether (a) individ- ual, family and social eating influences and (b) early eating patterns and family attitudes towards food differed in extreme weight condi- tions comprising underweight ED and obesity patients.

Method

Participants

The present study employed a case–control design. The final sample comprised 152 participants, 45 underweight ED patients {32 AN [14 AN restrictive subtype (AN-R) and 18 AN binge- purging subtype (AN-BP)] and 13 EDNOS-AN}, 65 obese patients and 42 female control participants. The underweight ED patients were admitted to the ED unit of our psychiatry department and diagnosed according to DSM-IV criteria (APA, 2000), using a semi-structured clinical interview [SCID-I (First, Gibbon, Spitzer, & Williams, 1996)]. The obese patients, who were seeking bariatric surgery or general ED screening, were recruited from the dietetics unit at our hospital and referred to the department of psychiatry for psychological evaluation. They did not meet any ED diagnosis (see criteria in the following paragraphs for assessment). Healthy controls were students of the University of Barcelona. All controls were from the same catchment area as index patients.

The inclusion criterion for the underweight ED sample was fulfilling DSM-IV criteria (APA, 2000) for AN or for EDNOS-AN di- agnoses. The criterion for EDNOS-AN patients was a lifetime mini- mum BMI< 17.5 kg/m2 (APA, 2000) (three EDNOS-AN patients failed to fulfil this criteria and were subsequently removed from the sample). The obesity group had to present with a BMI> 30 kg/m2.

The exclusion criteria for the healthy-eating control group were a lifetime history of ED ormental illnesses and a BMI< 18.5 kg/m2 or > 25 kg/m2. For the present analysis, 15 obese and 2 healthy control individuals had to be excluded because they presented with a previ- ous ED diagnosis; screened by the General Health Questionnaire-28 (GHQ-28; Goldberg, 1981) and the DSM-IV-TR criteria (APA, 2000).

The mean age of the whole sample was 31.24 years (SD=12.73). The prevalence of childhood obesity was 58.3% in the obesity group and 2.5% in the underweight ED group (p< .001).

Assessment

The Cross-Cultural Questionnaire (Penelo et al., 2011)

This retrospective self-administered questionnaire was developed by an expert group from various European countries. It includes 51 items, which are represented in six sections. A recent study (Penelo, et al., 2011) on the psychometric properties of the Cross-Cultural Questionnaire (CCQ) offers preliminary evidence that it is a useful and valid screening instrument to assess past and present factors of risk and maintenance for EDs in a variety of different countries. In the present study, the questions relating to individual, family and social eating influences, and the early eating environmental section were considered. A more detailed description of the later section can be found in earlier publications (Fernandez-Aranda, et al., 2007; Krug, et al., 2009; Penelo, et al., 2011). The 13 questions relating to early eating influences comprised a variety of factors such as body dissatisfaction, family weight concerns, relationships with family and friends, joint dieting with family and/or friends, teasing about eating habits and body shape as well as influences of the mass media. A copy of the whole instrument can be requested from the corresponding author.

The healthy-eating control group was assessed by self-report to quantify clinical symptomatology and general psychopathology. The battery of assessment included the EDI-2 (Garner, 1998), the SCL-90-R

(Derogatis, 2002), the GHQ-28 (Goldberg, 1981) and a self-designed clinical information sheet based on the SCID-I (First et al. 1996) assessing current diagnostic criteria for EDs, lifetime presence of EDs and weight history.

Procedure

All participants provided informed consent, and the study was approved by the Ethics committee of our University Hospital. Furthermore, it was emphasized that participation in the study was completely voluntary and that participants were free to withdraw from the study at any time.

Statistical Analyses

Statistical analyses was carried out with SPSS 19 for Windows. First, comparisons between the sociodemographic and clinical variables were carried out with analysis of variance procedures for quantitative variables and chi-square tests for categorical variables. Secondly, each CCQ item valuing eating influences, eating patterns and attitudes towards food during childhood (independent variables) was examined as predictor of diagnosis subtype (ED underweight, obese and healthy control groups) (dependent variable) with multinomial regression. Models were also adjusted by the covariate age.

Results

Sociodemographics and clinical characteristics Table 1 contains the socio-demographic and clinical characteristics for the different diagnostic groups. The obese patients were signifi- cantly older, more commonly married and presented with less secondary or university education than the underweight ED and healthy control groups. Furthermore, as expected, compared with the underweight ED and healthy control group, the obese group presented significantly higher values for current, maximum and minimum BMIs.

Individual, family and social factors influencing eating

The results for the individual, family and social eating influences are presented in Table 2. Having relationships with friends, teasing about eating habits by family members and the mass media influenced eating in the underweight ED group when compared to the healthy control group. Conversely, the patient's own physical appearance, body dissatisfaction, teasing about eating habits by friends/others and teasing about body shape by family members were more pronounced eating influences for obesity than for the healthy control group. Shared risk factors for underweight ED and obesity in comparison to the healthy control group comprised family relationships and teasing about body shape by friends. The variable family weight/shape concerns influenced eating was also common to both groups in comparison to the control group; however, the obesity group presented with a significantly higher proportion for this item than the underweight ED individuals. Finally, the underweight ED group scored significantly higher for the current fashion style item but values were not significantly different from the healthy control group. Conversely, the obesity group revealed significantly higher values for the joint dieting with familymembers variable than the underweight ED group, but again, no significant differences were obtained in relation to the control group.

Individual and family eating patterns and attitudes towards food

Table 3 depicts the individual and family eating patterns, and attitudes towards food during childhood and early adolescence. The results indicate that having regular meals with the family after 12 years, including meals as social events, never having eaten in fast food restaurants, restriction from snacks and shortage of luxury foods were positively related to obesity, whereas eating snacks and using food as reward were negatively associated with obesity. These relationships were obtained in comparison to the underweight ED and healthy control groups, who showed similar percentages across all questions. The variable, taking part in social meals, was the only item where the obesity group scored significantly higher than the underweight ED group; however, this finding was not significantly different from the healthy control group.

Discussion

To our knowledge, this is the first study assessing early eating influences and eating patterns in underweight ED and obese patients concurrently. Even though our study was limited by the retrospective design and the resulting recall biases, our main finding was that although some eating influences were shared between both disorders, various unique factors also emerged. Figure 1 provides a graphical representation of the common and specific eating influences for both groups. The factors, which influenced eating uniquely in the underweight ED group, comprised the following: having relationships with friends, teasing about eating habits by family members and the mass media. Conversely, the patient's own physical appearance, body dissatisfaction and teasing about body shape by family members as well as teasing about eating habits by friends where specific to obesity. All unhealthy eating patterns (eating snacks, food used as reward) that were found to be signifi- cant were negatively related to obesity. The magnitude of the Odds Ratios (ORs) of the reported findings was generally found to be high indicating that the effects are clinically meaningful.

Underweight EDs and obesity are part of a range of weight-related problems

The eating influences, which were found to be shared by the underweight ED and obesity groups (e.g. teasing about body shape by friends, family weight/shape concerns, and negative family environments), have commonly been reported in EDs and obesity and have been revealed to place girls at a greater risk for any type of weight-related condition (Haines, Neumark- Sztainer, Eisenberg, & Hannan, 2006; Neumark-Sztainer, 2009; Neumark-Sztainer et al., 2006; Waaddegaard, et al., 2009). This overlap may indicate that youngsters suffer from a range of weight-associated conditions or may advance from one dis- order (e.g. dysfunctional eating and/or dieting) to another one (e.g. obesity) (Villarejo et al., 2012). It is essential to recognize this variety of weight-related problems in order to prevent a chain of potentially harmful events and inadvertently causing one disorder (e.g. binge-purging and/or unhealthy dieting practices), while attempting to avoid another problem (e.g. obesity) (Neumark- Sztainer, Wall, Haines, Story, & Eisenberg, 2007; Stice, et al., 2005; Waaddegaard, et al., 2009).

Underweight EDs: social isolation, repetitive eating patterns and the mass media

Our observation that relationships with friends influenced eating in the underweight ED group might be related to the fact that ED patients, in specific AN individuals, have been exhibited to have difficulties relating to their peers and often feel isolated, a finding that has been related to autistic traits commonly reported in this patient group (Gillberg, Rastam, & Gillberg, 1994; Oldershaw, Treasure, Hambrook, Tchanturia, & Schmidt, 2011) and has also been replicated by our group in another independent European sample (Krug et al., 2012). However, our question was not able to disentangle whether maladaptive friendships, feeling isolated from peers or maybe more refined relationship dynamics were related to a later underweight ED diagnosis.

The fact that the underweight ED group experienced significantly more teasing about eating habits by family members than the obesity and healthy control group might be associated with the perfectionistic, selective (also known as 'picky' or 'fussy'), repetitive and obsessive–compulsive eating behaviours, which have been observed in AN patients also before the onset of the disorder (Jacobi et al., 2004; Micali et al., 2011).

In support of our findings that the mass media was specific to the underweight ED group, previous research (Becker et al., 2011; Westerberg-Jacobson, Edlund, & Ghaderi, 2010) has indicated that by providing an extreme adoption of the slim social ideal, and undesirable social standards and negative attitudes towards obesity, the mass media has shown to play a substantial role in the develop- ment of body dissatisfaction and dysfunctional eating patterns (Becker, et al., 2011; Striegel-Moore & Bulik, 2007). Interestingly, previous research (Salmon, Tremblay, Marshall, & Hume, 2011; Vandewater & Denis, 2011) has also shown that media use was pos- itively linked to obesity through the advertisement of high-calorie foods and the encouragement of sedentary behaviours. However, in the current study, we were not able to reveal such an effect.

In accordance with previous studies (Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007; Neumark-Sztainer, Wall, Haines, Story, Sherwood, et al., 2007), the eating influences specifically related to obesity comprised the patients' own physical appearance, body dissatisfaction, teasing about body shape by family

members and teasing about eating habits by friends. Accordingly, previous studies (Hayden-Wade et al., 2005; Neumark-Sztainer, 2009; Neumark-Sztainer et al., 2012) have indicated that family members and friends often provide negative comments about body shape and reinforce pressure to diet and to employ unhealthy weight control methods. Such pressures and teasing in addition to unsuccessful weight loss attempts and a constant control of food intake have been revealed to be associated with body dissatisfaction, low self-esteem, depression and other emotional problems (Adambegan et al., 2012; Eisenberg, Neumark-Sztainer, Haines, & Wall, 2006; Gunnard et al., 2011). Follow-up studies with numerous time points will be beneficial in detailing the temporal arrangement of such a teasing- emotional-body dissatisfaction-dysfunctional eating cycle.

Obesity and unhealthy eating patterns

The finding that regular meals with the family after 12 years and including meals as social events was positively related to obesity could be related to the fact that food, is more rewarding for these families. The findings that never having eaten in fast food restaurants and restricting the consumption of snacks and other luxury foods were positively related to obesity, is in agreement with previous studies that have shown that parental attempts to limit access to foods that children desire, such as snacks and sweets, might be of specific importance to obesity (Jansen, Mulkens, & Jansen, 2007; Scaglioni et al., 2008). It is also worth highlighting that almost 60% of the obese patients had suffered from childhood obesity, which might have evolved from a mixture of shared genetic factors and obesogenic behaviours transmitted by the parents (Sonneville et al., 2012). Hence, parents might have already been aware from an early age of their children's overweight problems. This might also explain the finding why in the obese group, food was less commonly used as a reward and snacking occurred less frequently. Finally, another interpretation of our findings may relate to the fact that obese people tend to report low intakes of food and to describe themselves as normal eaters (Scagliusi, Polacow, Artioli, Benatti, Lancha, 2003) and victims of their past (e.g. teasing as shown in our study) (Eisenberg et al., 2006). Further research is needed to clarify which of these two interpretations is the most plausible one.

Limitations

Study limitations need to be taken into account when interpreting the findings. First, it should be acknowledged that the CCQ is a retrospective self-report instrument and, therefore, it is susceptible to social desirability and recall biases. Second, the cross-sectional design does not allow us to determine causality of the variables assessed. Third, the power and reliability of the study to find differences between diagnostic variants was small. In addition, some of our EDNOS-AN participants had a current BMI> 17.5 kg/m2. Ideally extreme weight conditions as defined by the WHO (WHO, 1995) categories would have needed to entail severely underweight AN (BMI< 16 kg/m2) and obese III (BMI> 40 kg/m2) patients. However, obtaining a reasonable number of patients for these extreme weight conditions was beyond the scope of the present study. In addition, the fact that we were not able to interview our healthy control group on a face to face basis, but instead had to rely on self-report measures to rule out a current or past ED diagnosis, could have resulted in a less accurate ED assessment in this group. Finally, it should be acknowledged that there were significant differences in sociodemographics and age between the two patient groups and the control individuals. However, these were difficult to separate as risk factors for the illness.

Is an integrated ED and obesity prevention programme warranted?

The overlap of shared factors between the underweight ED and obesity groups provides evidence for an integrated prevention program that tackles a broad spectrum of weight-associated conditions. Such an approach makes sense economically and practically and may also be beneficial in reducing the susceptibility of accidentally triggering one disorder while attempting to avoid another problem (Haines & Neumark-Sztainer, 2006; Irving & Neumark-Sztainer, 2002; Neumark-Sztainer, 2009). Health professionals, families, schools, peers and the mass media need to collaborate to stipulate coherent and reliable information about the complexities of weight-related disorders and the negative effects of ineffective weight regulation and weight loss attempts. In addition, our findings indicate that prevention programmes should decrease weight-related pressures such as teasing and unhealthy eating patterns while promoting healthier alternatives (Beintner, Jacobi, & Taylor, 2012; Cromley et al., 2010; Irving & Neumark- Sztainer, 2002). Finally, it should be noted that even though an integrated design is warranted,

the non-shared factors should be treated with cautiousness in such a program, because highlighting excessively one problem may in fact induce an opposite reaction.

Conclusions

To our knowledge this is the first study, which has addressed a variety of eating influences and early eating behaviours and attitudes towards food in underweight ED and obesity concurrently. Although some of the variables of interest overlapped in both disorders, some distinctive factors also arose. This information can be useful for designing effective integrative prevention and intervention programmes for a range of weight-related conditions. Future aetiologic research should replicate the present findings using larger sample sizes and should prospectively examine addi- tional influencing factors, such as genetic predispositions, epigenetic changes, psychological tendencies and family dynamics. In addition, advanced structural equation modelling techniques should be employed to disentangle mediating or moderation effects of influencing variables such as body dissatisfaction, self-esteem and/ or depression.

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Table 1

	Underweight ED ($n=45$)	Healthy ($n=42$)	Obese ($n=65$)	p	Comparison
Age (years); mean (SD)	27.0 (8.3)	19.3 (2.1)	42.0 (10.4)	<.001	HC < ED < OB
Status civil (%)					
Without partner	85.4	100.0	32.8	<.001	(ED = HC) > OB
With partner	14.6	0.0	67.2		
Studies level (%)					
Primary	20.5	0.0	51.6	<.001	(ED = HC) < OB
Secondary or university	79.5	100.0	48.4		
Body mass index; mean (SD)					
Current	16.70 (1.92)	20.95 (2.20)	43.16 (6.81)	<.001	ED < HC < OB
Maximum	24.19 (5.43)	23.47 (5.37)	46.48 (8.23)	<.001	(ED = HC) < OB
Minimum	15.28 (3.65)	21.67 (6.29)	28.51 (6.27)	<.001	ED < HC < OB

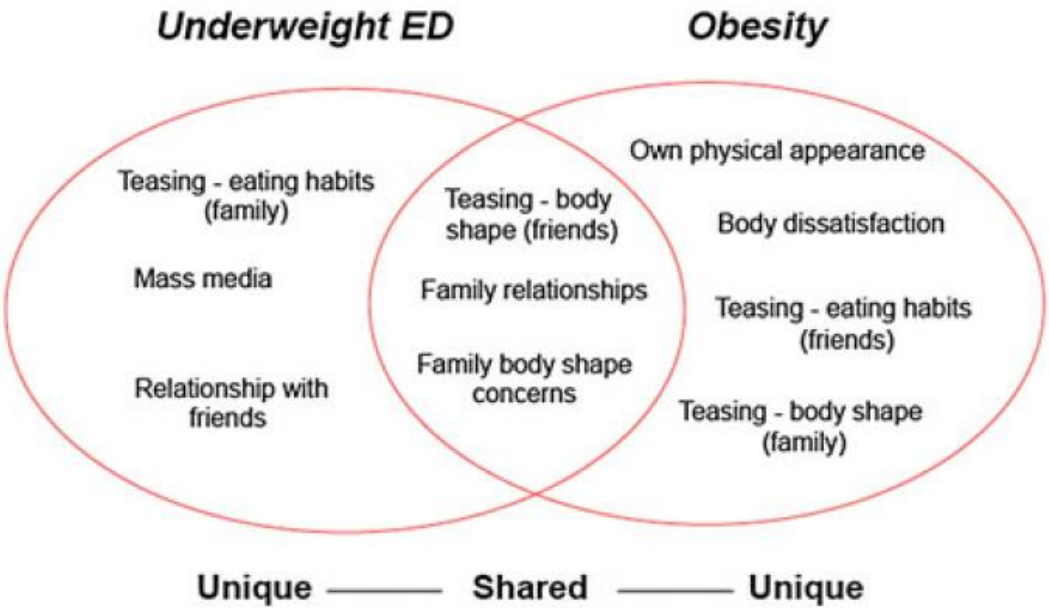
Table 2

Predictive accuracy of childhood attitudes; multinomial regression (OR)	Underweight ED ($n=45$; %)	Healthy ($n=42$; %)	Obese ($n=65$; %)	ED vs HC	ED vs OB	OB vs HC	Group comparisons
Physical appearance influenced eating	84.1	73.8	88.9	1.88	0.66	**2.84**	OB > HC
Dissatisfaction with body shape influenced eating	81.8	64.3	95.3	2.50	**0.22***	**11.3**	OB > (ED = HC)
Family weight/shape concerns influenced eating	41.5	7.1	76.2	**9.21**	**0.22***	**41.6**	OB > ED > HC
Family relationships influenced eating	48.8	7.1	44.4	**12.4**	1.19	**10.4**	(ED = OB) > HC
Relationships with friends influenced eating	55.8	23.8	40.3	**4.04**	1.87	2.16	ED > HC
Joint dieting with family members influenced eating	23.3	31.0	47.5	0.68	**0.34**	2.02	ED < OB
Joint dieting with friends influenced eating	20.9	14.3	17.7	1.59	1.23	1.29	—
Teasing about eating habits by family member(s) influenced eating	30.2	11.9	25.4	**3.21**	1.27	2.52	ED > HC
Teasing about eating habits by friends/others influenced eating	20.9	7.1	23.8	3.44	0.85	**4.06**	OB > HC
Teasing about weight/shape by family member(s) influenced eating	23.8	9.5	25.4	2.97	0.92	**3.23**	OB > HC
Teasing about weight/shape by friends influenced eating	37.2	7.1	28.6	**7.70**	1.48	**5.20**	(ED = OB) > HC
Mass media influenced eating	53.5	26.2	24.6	**3.24**	**3.53**	0.92	ED > (HC = OB)
Current fashion styles	62.8	42.9	33.3	2.25	**3.38**	0.67	ED > OB

Table 3

Predictive accuracy of childhood attitudes; multinomial regression (OR)	Underweight ED ($n=45$; %)	Healthy ($n=42$; %)	Obese ($n=65$; %)	ED vs HC	ED vs OB	OB vs HC	Group comparisons
Ate regular meals with the family before 12 years	51.1	38.1	57.8	1.70	0.76	2.23	—
Ate regular meals with the family after 12 years	22.2	23.8	52.4	1.91	**0.26**	**3.52**	(ED = HC) < OB
Ate meals at regular/set times of the day before 12 years	86.7	95.2	92.1	0.33	0.56	0.58	—
Having breakfast as the first meal	86.4	97.6	89.1	0.15	0.78	0.20	—
Never ate in fast food restaurants	55.6	38.1	79.7	2.03	**0.32**	**6.38**	(ED = HC) < OB
Food especially prepared for family member	37.8	26.2	27.0	1.71	1.64	1.04	—
Value placed on food by mother	40.9	57.1	45.2	0.52	0.84	0.62	—
Value placed on food by father	29.5	40.5	36.2	0.62	0.74	0.84	—
Mother paid attention to healthy eating	15.9	14.6	17.7	1.10	0.88	1.26	—
Father paid attention to health eating	6.8	4.9	8.2	1.43	0.82	1.74	—
Meals were included as social events >4 times/ month	55.6	54.8	81.3	1.03	**0.29**	**3.58**	(ED = HC) < OB
Taking part in social meals > 4 times a month	66.7	70.7	85.7	0.83	**0.33**	2.48	ED < OB
Parents had strict rules about food	22.2	14.3	25.4	1.71	0.84	2.04	—
Eating snacks ≥ 2–6 times a week	64.4	61.9	39.1	1.12	**2.83**	**0.39**	(ED = HC) > OB
Access to snacks was restricted	11.4	14.3	36.5	0.77	**0.22**	**3.45**	(ED = HC) < OB
Food used as reward	31.8	38.1	7.9	0.76	**5.41**	**0.14**	(ED = HC) > OB
Food used as punishment	20.5	21.4	17.5	0.94	1.12	0.78	—
Shortage of luxury foods in family	7.0	19.0	45.9	0.32	**0.09**	**3.61**	(ED = HC) < OB

Figure 1


Underweight ED
Obesity
Teasing - eating habits (family)
Mass media
Relationship with friends
Teasing - body shape (friends)
Family relationships
Family body shape concerns
Own physical appearance
Body dissatisfaction
Teasing - eating habits (friends)
Teasing - body shape (family)
Unique
Shared
Unique