Original Article

Cognitive restraint, uncontrolled eating and emotional eating: correlations between parent and adolescent

Blandine de Lauzon-Guillain^{*†}, Monique Romon[‡], Dara Musher-Eizenman^{*}, Barbara Heude^{*†}, Arnaud Basdevant^{§¶}, Marie Aline Charles^{*†} and the Fleurbaix-Laventie Ville Santé Study Group^{††}**

^{*}INSERM, IFR69, U780, Villejuif, F-94807, France, [†]Paris XI University, Orsay, F-91405, France, [‡]Nutrition Department, University Hospital, Lille, F-59000, France, [§]INSERM, Nutriomique U755, Paris, F-75004, France, [¶]Université Pierre et Marie Curie – Paris 6 – Faculté de Médecine, Paris, France, ^{**}AP-HP, Pitié Salpêtrière, Service de Nutrition, Hôtel-Dieu, Paris, F-75004, France, and ^{††}Association Fleurbaix-Laventie Ville Santé, Laventie, F-62840 France

Abstract

The purpose of this study was to examine, in a general population, the resemblance in eating behaviour between adolescents and their parents. This study was based on the first examination of a community-based epidemiological study in Northern France. Subjects were offspring aged 14–22 years (135 boys and 125 girls) and their parents (174 fathers and 205 mothers). The Three-Factor Eating Questionnaire Revised 18-item version (TFEQ-R18) identified three aspects of eating behaviour: cognitive restraint of eating, uncontrolled eating and emotional eating. Familial resemblance in eating behaviour was measured by partial Spearman's correlations, adjusted for age and body mass index.

Sons' uncontrolled eating was positively related to fathers' cognitive restraint of eating ($r = 0.36$), but not to fathers' uncontrolled eating ($r = 0.07$), nor to mothers' eating behaviour. Sons' cognitive restraint of eating was related to no parental eating behaviour scores. In daughters, cognitive restraint of eating was positively related to mothers' uncontrolled eating ($r = 0.26$), but not to mothers' cognitive restraint of eating ($r = 0.13$). Daughters' uncontrolled eating and emotional eating were positively associated with the same scores in mothers. Finally, daughters' eating behaviour was not related to fathers' eating behaviour.

In conclusion, correlations in eating behaviour were higher with the parent of the same gender, and eating behaviours in adolescents seem to reflect opposition to parents' behaviour more than familial resemblance.

Keywords: eating behaviour, familial resemblance, adolescence, TFEQ-R18, epidemiology.

Correspondence: Blandine de Lauzon-Guillain, INSERM U780, 16 Avenue Paul-Vaillant Couturier, 94807 Villejuif cedex, France.
E-mail: blandine.delauzon@inserm.fr

Introduction

Obesity shows familial aggregation, and it has been suggested that the genetic relationship accounts for most of the familial resemblance in body mass index (BMI) among adults (Sorensen *et al.* 1992). However, the rapid secular increase in the prevalence of obesity cannot be attributable only to genetic factors. Shared environment and resemblance in behaviours may also be responsible for the familial aggregation of obesity.

The family has a major influence on the children's eating behaviours (Fulkerson *et al.* 2002). Previous studies underlined a familial aggregation in eating disorders (Whelan & Cooper 2000), as well as in food intake (Faith *et al.* 2004). Moreover, familial resemblance in dietary intake depended on shared meals: the more meals family members shared, the stronger was familial resemblance in dietary intake (Billon *et al.* 2002; Hannon *et al.* 2003).

A great heritability of eating behaviour was highlighted in twin studies (de Castro & Lilenfeld 2005; Tholin *et al.* 2005). However, these studies were interested in resemblance in eating behaviours of subjects of the same generation, and few studies were conducted with an intergenerational design. Little is known about the influence of parental modelling in eating behaviour on offspring's eating behaviour, especially during adolescence. Adolescence, a transition towards independence and autonomy, is a critical period in the development of eating behaviour, and eating habits formed in adolescence are likely to affect long-term behaviours (Story *et al.* 2002; Videon & Manning 2003). Furthermore, as adolescent eating attitudes are known to be affected by the socio-cultural pressure to be thin and by peer dieting attitudes (Fulkerson *et al.* 2002), the influence of parents on eating behaviour could decrease at that time. Therefore, strong associations between parents and child behaviour persisting in adolescence would favour targeting the family for the prevention of abnormal behaviour and would also encourage the search for genetic factors.

Therefore, the first objective of this study was to examine, in the general population, whether restrained eating, uncontrolled eating and emotional eating during adolescence were related with parental

eating behaviour. As restrained eating and disinhibition of control may be associated and lead the subject to a vulnerable weight cycle (Lowe 1993), the second goal of this study was to determine whether a given aspect of adolescent eating behaviour was influenced only by the same aspect of parental eating behaviour or also by other aspects of parental eating behaviour.

Research methods and procedures

Study design

Subjects were participants in the Fleurbaix-Laventie Ville Santé II (FLVS II) Study. The purpose of the FLVS II Study was to investigate the risk factors for weight and adiposity changes in the general population. This community-based cohort was constituted in 1999 on a voluntary basis and included 1175 subjects, aged ≥ 8 years, from families living in two small cities of Northern France, Fleurbaix and Laventie, and surrounding areas, who had participated in a previous study: the Fleurbaix-Laventie Ville Santé I. This first study was a follow-up of children involved in a nutritional education school programme. It involved all 579 families who had at least one child in the last section of pre-school and in primary school in 1992 in the cities of Fleurbaix and Laventie. The FLVS II Study was proposed to 393 families who were still living in the area and could be reached in 1999, and 294 (75%) agreed to participate. The main differences between families who agreed or refused to participate in FLVS II were: participating families' cities of residence were more likely to be Fleurbaix and Laventie than the smaller cities, and participating families had a lower frequency of overweight children in 1992 (8% vs. 13% of overweight children, respectively, $P = 0.01$). Other variables such as parents' overweight, age and gender did not differ between the two groups. The study protocol of FLVS II was approved by the Ethics Committee of Lille in July 1998, and the data files were declared to the National Committee for the respect of freedom and rights in computerized data (CNIL).

Anthropometric data

Anthropometric data were collected at school by trained doctors. Weight was measured to the nearest

0.1 kg with the subjects wearing light clothes, and height was measured to the nearest 5 mm. BMI = weight in kg/(height in m)² was then calculated.

Three-Factor Eating Questionnaire Revised 18-item version (TFEQ-R18)

Eating-related behaviours were assessed by using a French translation of the TFEQ-R18 (Karlsson *et al.* 2000). The instrument is a shortened and revised version of the original 51-item TFEQ (Stunkard & Messick 1985). The French translation was accomplished by using common procedures for cross-cultural adaptation, including back translation by a native English speaker. The questionnaire refers to current dietary practice and measures three different aspects of eating-related behaviour: cognitive restraint of eating (CR: 6 items), uncontrolled eating (UE: 9 items) and emotional eating (EE: 3 items). Cognitive restraint of eating represents a conscious restriction of food intake in order to control body weight or to promote weight loss; uncontrolled eating measures the tendency to eat more than the usual because of a loss of control over intake; and emotional eating characterizes overeating during dysphoric mood states (i.e. when feeling lonely, blue or anxious). Each score ranges from 0 to 100, with a higher score indicative of greater level in the eating behaviour of interest. The applicability of the TFEQ-R18 to the French FLVS II population, and its internal validity, has already been described (de Lauzon *et al.* 2004). Internal consistency reliability coefficients (Cronbach's α) for each of the three scales were above the 0.70 standard and below the 0.90 limit recommended for individual assessment (CR: 0.84 in adults, 0.80 in adolescents; UE: 0.83 in adults, 0.80 in adolescents; EE: 0.87 in adults, 0.78 in adolescents).

Participants

Only subjects older than 14 years answered the entire TFEQ-R18 and were therefore considered for this analysis. Of the 887 subjects older than 14 years who participated in the study in 1999, 14 individuals were excluded because of missing socio-demographic or anthropometric data, and 17 individuals did not

complete the TFEQ-R18. Only 10 offspring (3%) were aged 23–27 years, whereas the rest were 14–22 years. Therefore, for analyses, we only considered offspring between the ages of 14 and 22. Of the 294 FLVS II families, 207 families included at least one offspring aged 14–22 years in 1999. In families including more than one boy or more than one girl in the targeted age range, one boy and one girl were randomly selected to estimate the familial resemblance in eating behaviour. Therefore, the independence between observations was respected because we conducted analyses separately in boys and in girls. A total of 155 parents were excluded from analyses because they had no offspring older than 14 years.

Thus, the final sample was composed of 174 fathers and 205 mothers (aged 34–67 years), 135 sons and 125 daughters (aged 14–22 years).

Statistical analysis

As eating behaviour scores were not normally distributed, the differences in baseline characteristics between males and females were tested, in each generation, by a Kruskal–Wallis test. The relationship between parents' eating behaviour and offspring's eating behaviour was tested by partial Spearman's correlations adjusted for offspring's age, offspring's BMI, parental age and parental BMI. Fathers and mothers, on the one hand, and sons and daughters, on the other hand, were considered separately.

The Statistical Analysis Systems software package version 8.2 (SAS Institute, Cary, NC, USA) was used for the analyses.

Results

Gender differences

Fathers (Table 1) were older than mothers ($P < 0.001$), and they were also heavier ($P < 0.001$ for BMI). Sons and daughters were similar in age ($P = 0.50$) and BMI ($P = 0.77$). TFEQ-R18 scores were significantly different between genders, both in parents (Table 1) and in offspring. Cognitive restraint and emotional eating reached higher levels in girls than in boys ($P < 0.001$ in both groups). Uncontrolled

Table 1. Gender differences in the parents' and offspring groups

	Father	Mother	Son	Daughter
<i>n</i>	174	205	135	125
Age (year)	44.6 (41.8–48.6)	42.9 (40.3–45.8)*	16.4 (15.1–18.3)	16.8 (15.3–18.5)
BMI (kg/m ²)	25.7 (23.4–28.4)	23.6 (21.5–26.7)*	20.0 (18.2–22.8)	20.3 (18.6–22.0)
Eating behaviour				
Cognitive restraint (0–100)	22.2 (5.6–33.3)	44.4 (27.8–55.6)*	16.7 (5.6–27.8)	38.9 (16.7–50.0) [†]
Uncontrolled eating (0–100)	25.9 (7.4–37.0)	25.9 (12.5–40.7)	40.7 (25.9–51.9)	33.3 (22.2–48.1) [†]
Emotional eating (0–100)	11.1 (0.0–33.3)	44.4 (22.2–66.7)*	22.2 (0.0–44.4)	44.4 (22.2–66.7) [†]

BMI, body mass index; values are medians (interquartile range); *significantly different from fathers' values (Kruskal–Wallis test, $P < 0.05$); [†]significantly different from sons' values (Kruskal–Wallis test, $P < 0.05$).

Table 2. Spearman's correlations between TFEQ-R18 scores within each subgroup

	Father	Mother	Son	Daughter
<i>n</i>	174	205	135	125
CR and UE	0.26*	0.18*	0.16	0.00
CR and EE	0.34*	0.23*	0.22*	0.25*
UE and EE	0.60*	0.66*	0.43*	0.48*

TFEQ-R18, Three-Factor Eating Questionnaire Revised 18-item version; CR, cognitive restraint; UE, uncontrolled eating; EE, emotional eating; *significant Spearman's correlations ($P < 0.05$).

eating tended to be stronger in sons than in daughters ($P = 0.013$), but there was no difference between mothers and fathers ($P = 0.23$).

Correlations among TFEQ-R18 scores

Among parents, all TFEQ-R18 scores were significantly correlated two by two (Table 2), whereas among adolescents cognitive restraint and uncontrolled eating were not significantly correlated ($P = 0.07$ in sons; $P = 0.96$ in daughters).

Parent–offspring correlations

Sons' restrained eating was not correlated with parents' eating behaviour scores (Table 3). Sons' uncontrolled eating (Fig. 1) was moderately correlated with fathers' restrained eating ($r = 0.36$) as sons' emotional eating and fathers' restrained eating ($r = 0.26$) or mothers' emotional eating ($r = 0.25$).

Table 3. Spearman's correlations between eating behaviour scores in parents and in late adolescents. These correlations were adjusted for parent's age and body mass index, and adolescent's age and body mass index

	Sons			Daughters		
	CR	UE	EE	CR	UE	EE
Fathers	<i>(n = 115)</i>			<i>(n = 104)</i>		
CR	0.16	0.36*	0.26*	−0.02	−0.01	−0.12
UE	0.01	0.07	0.18	0.00	0.07	−0.03
EE	0.06	0.16	0.20*	0.03	−0.06	−0.01
Mothers	<i>(n = 132)</i>			<i>(n = 124)</i>		
CR	0.04	0.17	0.17	0.13	−0.01	0.10
UE	0.12	0.15	0.18*	0.26*	0.22*	0.20*
EE	0.07	0.15	0.25*	0.20*	0.12	0.24*

CR, cognitive restraint; UE, uncontrolled eating; EE, emotional eating; *significant Spearman's correlations ($P < 0.05$).

The familial relationships in eating behaviour scores were quite different in daughters. Daughters' eating behaviour was not related to any aspect of their fathers' eating behaviour. Daughters' uncontrolled eating and daughters' emotional eating were moderately related to the same aspects of eating behaviour in mothers ($r = 0.22$ and $r = 0.24$, respectively). Moreover, daughters' restrained eating was moderately linked to mothers' uncontrolled eating, whereas other correlations between daughters' eating behaviour and mothers' eating behaviour were quite weak.

The correlations between parental and offspring eating behaviour were also performed without adjustment for child's BMI and parental BMI (data not shown). The results were very similar to those presented here.

Fig. 1. Graph of Spearman's correlations, adjusted for parent's age and body mass index (BMI), and adolescent's age and BMI.

Table 4. Spearman's correlations between eating behaviour scores in fathers and in mothers. These correlations were adjusted for father's age and body mass index, and mother's age and body mass index

	Mothers		
	CR	UE	EE
Fathers		(n = 170)	
CR	0.22*	0.17*	0.13
UE	0.12	0.19*	0.09
EE	0.17*	0.24*	0.24*

CR, cognitive restraint; UE, uncontrolled eating; EE, emotional eating; *significant Spearman's correlations ($P < 0.05$).

Father–mother correlations

Eating behaviour scores were also significantly correlated between mothers and fathers, but all correlation coefficients were below 0.25 (Table 4).

Discussion

First, our study showed higher correlations in eating behaviour between parents and offspring of the same sex. Second, parents–offspring correlations were stronger between aspects of eating behaviour that could appear as opposite (e.g. cognitive restraint of eating and uncontrolled eating). Finally, emotional eating scale in offspring appeared to be associated unspecifically with several aspects of parental eating behaviour.

The offspring and parental eating behaviour correlation coefficients were higher first among boys and fathers than among boys and mothers, and second among girls and mothers than among girls and fathers. Such an identification with the parent of the same gender on eating behaviour development was previously underlined (Elfhag & Linne 2005) but only among mothers. Our results extended this gender difference in the correlation with fathers' eating behaviour.

Our results also showed interesting associations between an aspect of eating behaviour in adolescents and another aspect in parents that could be considered opposite. Uncontrolled eating scores reached higher levels in boys, as in the Quebec Family Study, where situational susceptibility and especially hunger (both included in our uncontrolled eating score) were higher in boys than in girls (Drapeau *et al.* 2003). Sex differences for uncontrolled eating were not seen in adults. Growing adolescent boys may have greater susceptibility to hunger because of high energy needs. Boys could also more easily acknowledge their susceptibility to external food solicitations. Uncontrolled eating was positively linked to fathers' restrained eating, but not to fathers' uncontrolled eating in our study. In contrast, restrained eating was more developed in girls, as also found in other studies (de Castro 1995; Drapeau *et al.* 2003; Provencher *et al.* 2003; Neumark-Sztainer *et al.* 2004). This eating behaviour

was positively associated with maternal uncontrolled eating, but not with mothers' restrained eating. These opposite associations between adolescent eating behaviours and parental eating behaviours may be specific to adolescence, and also a mark of adolescence autonomy process (Arnett 1999). Adolescents' eating attitudes also appear to be more influenced by encouragement to diet, and negative input about their weight status from parents and peers, than by parental modelling in eating attitudes (Keel *et al.* 1997; Hill & Franklin 1998; Smolak *et al.* 1999; Baker *et al.* 2000; Field *et al.* 2001). The parents' own eating behaviour could be different from the advice they provide to their offspring, and parental modelling of particular eating-related behaviours may have unintended consequences on the eating behaviour of their offspring. However, in cross-sectional studies, it is not possible to determine a causal link between parental and offspring eating behaviours. Therefore, an influence of offspring's eating behaviour on parental eating behaviour cannot be excluded. Moreover, it should be noted that eating behaviour estimated by the TFEQ-R18 was reported and not assessed by an external examiner and therefore represents perceived eating behaviour that could be different from actual eating behaviour. Finally, a great number of correlations were analysed in this study, then some of the significant associations could be a result of chance findings.

Offspring's emotional eating was correlated with several aspects of parental eating behaviour (except between father and daughter). As experiencing negative affect (loneliness, anxiety, feeling blue) is a prerequisite of endorsement of the emotional eating items, it is possible that when children have a high level of emotional eating, it is a reaction to a more global problem within the family. This poor functioning within the family may also be reflected in unregulated eating, by different ways, on the part of the parents. However, this association between offspring's emotional eating and all parental eating behaviour scores could also be partially explained by the strong correlation of emotional eating with other TFEQ-R18 scores, which confuse the association between emotional eating and the other eating behaviour scales. To increase the internal validity of the emotional eating scale and weaken the correla-

tion between this scale and the other scales of the TFEQ-R18, three new items have been added, contributing to the TFEQ-R21 (Tholin *et al.* 2005). Unfortunately, the revised TFEQ-R21 was not available at the beginning of our study. The correlations between offspring's emotional eating and parental eating behaviour should therefore be considered carefully, and other studies should confirm our results.

Whereas twin studies (de Castro & Lilenfeld 2005; Tholin *et al.* 2005) and studies including relative pairs in multiple generations showed a great heritability of eating behaviour, we did not find a strong resemblance in eating behaviour within a family (Steinle *et al.* 2002). These differences may be explained by the study design. In fact, the levels of the correlation coefficients in eating behaviour between parents and adolescents in our study were similar to those estimated in another study with an intergenerational design (Elfhag & Linne 2005). In any case, the weak familial correlations in eating behaviour indicate that family resemblance is not the only contributor to restrained eating, uncontrolled eating and emotional eating in adolescents. Several studies have shown that peers, media, societal pressure and food availability could have a significant impact on eating behaviour among adolescents (Huon & Walton 2000; Huon *et al.* 2000; Story *et al.* 2002). However, we were not able to test this hypothesis in the present study.

Snacking appears to be common in France, both in adults and in children (Bellisle *et al.* 2003; Volatier, 2000). A recent study compared meal patterns in Southern France and Central England and found that the French were most likely to follow a regular meal pattern of three meals a day whereas the English eat more energy-dense snack foods (Pettinger *et al.* 2006). Those cultural discrepancies could have an impact on adolescents' eating behaviour and our results should therefore be confirmed in other population samples. Finally, in our study of the general population, eating behaviour scores did not reach high levels (median always below the middle of the scale). Associations between eating behaviour scores in parents and eating behaviour scores in offspring might be different with extreme scores, as found in previous studies of transmission of eating disorders

from mothers to children (Stein *et al.* 1994; Bulik *et al.* 2000; Whelan & Cooper 2000; Elfhag & Linne 2005).

In conclusion, in the general population of adolescents, eating behaviours seem to reflect opposition to parents' behaviour more than parental resemblance. The presence of father-son relationships is noteworthy in a field where studies are often limited to the mother's influence. The weak familial correlations on eating behaviour highlight the interest in conducting studies with data on peer influences, media, societal pressures and food availability.

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Conflicts of interest

None declared.

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