

Revealing Sex Differences in Childhood Obesity by Using a Family Systems Approach*

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In an exploratory investigation within a controlled study, families of obese boys and girls have been shown to differ in a number of ways. Fathers appear to play a far more important role than previously assumed, particularly in relation to obesity in boys. The fathers' obese appearance, mental health, and contact with paternal grandparents are all relevant. Families of obese girls contained more obese members and showed worse functioning and a more intense and ambivalent orientation toward the obesity than did families of obese boys. The degree of obesity in both boys and girls was associated, in different ways, with the mental

health of other members of the family, and in relation to certain other family factors. The findings are consistent with a theory of obesity as an identity disturbance.

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OBESITY means different things for men and women in Western society, but whether the origins and maintenance of obesity are different in the two sexes is unclear. Within different Western societies there are different sex-related patterns in the prevalence of obesity—which is commonly defined as weight more than 20% over adjusted expected bodyweight. For example, prevalence of obesity in boys and girls prior to adolescence is similar in the U.K. (25), whereas in Czechoslovakia, girls have a lower prevalence than boys (21).

The family is the mediating agent for social and cultural influences on children, and provides their most intense and enduring emotional experiences. Yet there is little formal research into whether and how factors within the family contribute to sex differences in relation to obesity. The aim of this article is to contribute to a systematic understanding of the characteristics that distinguish between families of obese girls and those of obese boys.

In a review of the literature on family

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factors in childhood obesity (19), we found that there were no satisfactory observational studies of *whole* families, and that existing studies tended to generalize from findings in individual family members or in the mother-child dyad (3, 22, 29). Studies of psychological variables in groups of obese boys and girls found no significant differences between the sexes. The belief that obesity carries a greater social stigma for adolescent girls and young women is the main difference between the sexes that is confirmed systematically (6, 7, 20, 32).

The present article is based on a controlled study of obese children within their families carried out from a family-systems perspective. So far, we have reported features in three areas. First, we examined the emotional health of the families and their members (15). Families with obese children showed significantly greater impairment in functioning when rated using clinical methods, but not using standardized, objective methods. Although the emotional health of individual members was not worse than control families, significant differences in the patterning of emotional health were found. In particular, there was a disconnection between family functioning and child disturbance. Finally, we found that the more overweight the index child, the healthier the mother rated the family and the healthier she was herself.

Second, we investigated characteristic family attitudes and experiences toward obesity and its management and to social life (17). It emerged that obesity was experienced as an intense, pervasive, and negatively-valued problem. However, although family members felt responsible for the condition, they often preferred to be fat and tended not to deal actively with obesity. Families with no contact with medical agencies had the most positive attitudes toward eating and being obese.

Third, we identified characteristic patterns of interaction among family members

(18). The most significant was a desire to make a good impression, which overlaid and partially obscured more or less severe interactional problems. These included marital hostility and family tension, parents criticizing children directly and handling them differentially. The strongest alliance was cross-generational. The obese child was usually treated worst, and tended to withdraw or to be excluded.

The findings from these three investigations cohered and led us to postulate the existence of a family syndrome in which obesity is a manifestation of psychosocial identity. This syndrome may possibly be the basis for obesity in later life, which is classified as "juvenile-onset" (31) or "development" (5). Adults with this form of obesity have poorly differentiated emotions, body-image disturbances, a diffuse sense of self, and other identity problems.

In each of the above three studies an important difference between the sexes was found. In the first, we found that only in the families of the obese girls did the degree of obesity correlate inversely with the objectively assessed quality of the functioning of the family, that is, the fatter the girl, the worse the family functioned (12). In the second, we found that only in the families of the obese girls was eating judged to be out of control (17). In the third, marital hostility tended to be more noticeable between the parents of the obese girls in a standardized, audiotape-administered interview (18). The coherence and potential significance of these findings led us to undertake a systematic analysis of the quantitative and qualitative data gathered in the project according to sex.

It should be noted that the project was specifically designed to reveal family-system operation, not to determine sex differences. Hence, an exploratory study such as this must be treated with caution and checked by further hypothesis-testing research. The present study was therefore

concerned to reveal any consistent and coherent trends, rather than to pinpoint definitive findings or provide explanations. The justification for presenting the results now lies in our rigorous adoption of the family-system viewpoint, and in the serious lack of knowledge, even denial, of sex differences in the research literature—despite their social importance, and after so many years of investigation.

METHODS

Because detailed accounts of the sample, design, procedures, and methods are given in the articles just referred to (12, 17, 18), the following description is restricted to the most relevant details.

Sample

The sample consisted of 65 families in two main groups: 37 families with an obese index child ("obese families"), and 28 families without an obese child ("control families"). The obese families consisted of three nearly equal subgroups recruited from (a) an outpatient obesity clinic ("hospital-obese"); (b) the list of a local general practitioner ("GP-obese"); and (c) a local primary school ("school-obese"). The control families were made up of two nearly equal subgroups from (a) an outpatient clinic for children with coeliac disease ("coeliac"); and (b) the above-mentioned local primary school ("school-normal"). The various subgroups did not differ significantly in sex composition, on demographic factors, on family composition and structure variables, or on key measures, but the "school-obese" children were less overweight than the other two obese groups. There was a nonsignificant trend in the control group for refusal to be sex-linked; more of the obese families who refused contained an index girl.

Procedure

After recruitment and initial interview for basic demographic and family history

data, the families were given a task interview, the Family Task Interview (FTI), at the Department of Psychological Medicine, Hospital for Sick Children (London). Index children (obese and control) were weighed directly after the FTI; 6–12 weeks later the families were interviewed at home to assess the family's experiences and attitudes in regard to obesity-related issues. Consent to the procedures was sought and obtained from the families. Families were told that our interest was in family life and understanding patterns of eating. Various measurements were made and questionnaires administered at the two contacts with the families. All data were then coded and punched for analysis on the University of London computer. Statistical analyses were carried out using nonparametric tests (30) via the Statistical Package for the Social Sciences (SPSS).

Instruments and Measures

The *Family Task Interview* (FTI) has been developed to elicit family interaction (14). It is administered by taperecorder, and consists of a series of 7 straightforward verbal and nonverbal tasks, which the family are asked to do together as a family. The FTI was observed by 3 researchers using a closed-circuit TV system, and was later viewed on videotape. After all families had completed the research design, 24 videotapes of 12 obese families and 12 control families (each consisting of 2 parents and at least 2 children) were chosen at random for detailed analysis. The *Family Experience Interview* (FEI) (17) is a modified version of the Standardised Clinical Family Interview (12, 13). It was administered in the family home to the whole family and recorded on audiotape. The interview explored family experiences around the following issues: attitudes, causes, and management of their condition (obesity or coeliac disease); food, meal-times, and eating behavior; popular images and society's attitudes or stereotypes of the

condition. The *Home Interview Assessment* (HIA) contained a variety of questions about the family's experiences and attitudes toward eating and obesity (or coeliac disease) to be answered on the basis of material elicited by the FEI. The HIA was completed after the interview by the researcher who had interviewed the family, and subsequently and independently by another researcher after listening to the interview on audiotape. Reliability was checked for each item and unreliable items were excluded from the analysis.

Two different assessments of body size were used. *Body weight* was used for the index child and obesity was defined as a weight exceeding the expected body weight by 20% or more after adjusting for height, sex, and age (8). The obese boys and girls were divided into equal "more obese" and "less obese" groups, using the median weight as a criterion. This cutoff point corresponded to 40% overweight in the boys and 30% in the girls. The sample contained none of those rare, severely obese children with weights more than double that expected. "Eye-ball" ratings, corresponding to the popular notion of fatness, were developed using 5 categories of body size: Very Fat, Fat, Plump, Just Right, and Thin. Such ordinal ratings were made on the body size and shape of all family members at the FTI and FEI. The former rating was consensual between the three observers, the latter made by the interviewer. Agreement between the two sets of rating was acceptable: complete agreement in 68% and no 2-point disagreements. The consensual rating was used for the analyses because it was made at the same time as most other measurements. The correlation between the percentage overweight and the Eyeball Rating for the index child was similar in both sexes: 0.66 ($p < .005$) for obese boys, and 0.58 ($p < .006$) for obese girls.

The *Family Health Scales* (FHS) was the principal measure of the quality of overall family functioning (16). It is a clinical instrument designed to be used in conjunction with direct observation of family interaction. It has 26 subscales grouped under 6 main scales: affective status, communication, boundaries, alliances, adaptability and stability, and family competence. Rating for each main scale is on a 7-point health/dysfunction continuum, and the scoring process provides a single figure between 1 and 7 for the overall quality of the functioning of the family. Ratings were made by three raters independently, with a reliability of .87 (14). The *Family Functioning Index* (FFI) is a brief self-report questionnaire, with separate forms and scores for mother (FFIm) and father (FFIf), which provides an indication of the overall quality of family functioning (23). It inquires into various aspects of family life (for example, time spent together, decision-making, disagreements) and into marital satisfaction. Psychological health of each member of the family was assessed using the 60-item version of the *General Health Questionnaire* (GHQ) (10) for each parent and any child over 16 years, the *Rutter A Scale* (PR) (28) for children of school-age, and the *Behaviour Check List* (BCL) (26) for pre-school children.

Family information and demographic data were obtained using a standard questionnaire. Social class was assessed on the basis of the father's occupation (or mother's where there was no father) using the Registrar General's classification. Mother's statements about accommodation, religious affiliation, and so on, were accepted at face value.

RESULTS

Comparability of Groups and Family Factors

Before assuming that any differences between the families of the obese boys and

girls are due to the sex of the child, one has to exclude two possibilities: first, that the two groups might differ in significant respects other than sex of the index child and, hence, any differences might not be *due to obesity*; and second, that the control groups might show similar differences based on the sex of the index child and, hence, the findings are not *specific to obesity*. The first possibility was examined by analyzing the demographic data and composition of the families and structure; the second possibility by regularly analyzing sex differences in the control group.

Comparison of the groups with respect to demographic criteria such as social class, type of accommodation, cultural origin, and expressed religious affiliation, showed no significant differences between the sexes within the obese group or in relation to the controls (see Table 1). Similarly, comparing the groups in regard to basic features of

family structure and composition, including ages and sibling position, showed no significant differences (see Table 2). The degree of obesity did not differ significantly between the sexes.

We considered that family factors, particularly "family type" (see Table 2), might be regarded as important to control for in the statistical analyses. However, family type is a superficial notion from a family-therapy perspective. For example, two parents in one family might arrange jobs so that they rarely meet each other, whereas a single parent in another might have a cohabitee who shared family tasks intimately. These subtleties could not be handled in the present study. So, where we found no empirical evidence of any difference and no theoretical reason existed for splitting the sample by family type, the whole sample was treated as one group.

Data on a number of other individual

TABLE 1
Demographic Details Analyzed by Sex with Control Group Comparison

	Obese		Non-Obese	
	Boys	Girls	Boys	Girls
Sample size	17	20	14	14
Source of sample				
Hospital	6 (35)	7 (35)	8 (57)	5 (36)
School	6 (35)	7 (35)	6 (43)	9 (64)
GP practice	5 (29)	6 (30)		
Social class				
I	0	0	2 (14)	2 (14)
II	5 (29)	5 (25)	2 (14)	1 (7)
III	10 (59)	11 (55)	7 (50)	6 (43)
IV	2 (12)	3 (15)	1 (7)	3 (21)
V	0	1 (5)	2 (14)	2 (14)
Type of accommodation				
Council-rented	9 (53)	16 (80)	6 (43)	6 (43)
Owner-occupier	5 (29)	2 (10)	7 (50)	5 (35)
Other	3 (18)	2 (10)	1 (7)	3 (21)
Cultural origin				
Both parents British	13 (76)	12 (60)	10 (71)	8 (57)
One parent British	3 (18)	3 (15)	3 (21)	3 (21)
Both parents non-British	1 (6)	5 (25)	1 (7)	3 (21)
Religious affiliation	12 (71)	10 (50)	6 (43)	5 (36)

Note: Percentages are shown in parentheses.

TABLE 2
Family Composition, Structure and Ages Analyzed by Sex in Obese and Control Group

	Obese		Non-Obese	
	Boys	Girls	Boys	Girls
Sample size	17	20	14	14
Family type				
Two natural parents	13 (76)	16 (80)	12 (86)	8 (57)
One parent family	3 (18)	4 (20)	0	5 (36)
One natural/one step- Foster parents	1 (6)	0	1 (7)	1 (7)
	0	0	1 (7)	0
Stage of family life cycle				
All pre-school	1 (6)	0	0	0
School & under 13 yrs.	8 (47)	14 (70)	10 (71)	10 (71)
Teenagers at home	7 (41)	4 (20)	4 (29)	4 (29)
Oldest child left home	1 (6)	2 (10)	0	0
No. of children at home				
One	3 (18)	5 (25)	3 (21)	3 (21)
Two	8 (47)	7 (35)	7 (50)	9 (64)
Three	5 (29)	6 (30)	3 (21)	2 (14)
Four	1 (6)	2 (10)	1 (7)	0
Position of index child				
Only child	3 (18)	4 (20)	3 (21)	3 (21)
Oldest	8 (47)	7 (35)	7 (50)	7 (50)
Youngest	4 (23)	7 (35)	4 (29)	3 (21)
Middle	2 (12)	2 (10)	0	1 (7)
Age of index child				
Mean (SD)	9.4 (2.3)	9.3 (3.3)	8.6 (3.1)	8.6 (2.5)
Pre-school	1 (6)	2 (10)	1 (7)	0
School	16 (94)	17 (85)	13 (93)	14
Work	0	1 (5)	0	0
Age of mother				
Mean (SD)	37.1 (6.2)	36.0 (7.3)	35.8 (5.4)	36.1 (5.7)
Age of father				
Mean (SD)	39.0 (7.1)	38.2 (5.4)	38.8 (6.1)	36.7 (6.3)

Note: Percentages and standard deviations are shown in parentheses.

and family factors were elicited at the initial interview, for example, hospitalizations and psychiatric history, which other investigators have suggested might be associated with obesity. In studying these, only one proved statistically significant—closeness to the *paternal* grandparents. The fathers of the obese boys were more often in at least weekly contact with their parents than were either the fathers of the obese girls (77% vs. 33%; $p = .087$) or the fathers of the control boys (77% vs. 18%;

$p < .025$). The families of the more obese boys more often lived less than 30 minutes travel-time from the paternal grandparents than did the families of the less obese boys (100% vs. 43%; $p < .05$); and the fathers of these more obese boys tended to be in contact with their parents more often. The fathers of the more obese girls were also more often in contact with their families of origin than were the fathers of the less obese girls (57% vs. 13%; $p < .01$). Contacts with the maternal grandparents and

proximity to them were similar for the two sexes in the obese group, irrespective of degree of obesity of the index child; and no differences were found between obese and control groups.

Differences in Obesity of Family Members

The assessment of obesity in family members is detailed in Table 3 according to whether the index child is a boy or a girl. Obese boys tended to be more overweight than obese girls, showing approximately a 10% higher mean and a 10% higher median standardized weight, but the range of overweight was similar in both sexes. In the control group, the boys' weights cluster around 102%, with a mean and median

weight 10% and 8% respectively higher than that of the girls whose weights are slightly more dispersed. On Eyeball Rating, the obese girls looked fatter than did the obese boys ($p < .05$).

Sex differences were also noticeable with regard to parental obesity. Obesity is not uncommon in the control parents: it was found in 7 of 24 (29%) of fathers and 8 of 26 (31%) of mothers. Obesity is absent (by selection) in the index children of control families and is rare among their siblings. Parents of obese children more often looked obese than parents of control children, but only significantly so in the case of the father ($p < .05$). There is a trend in both the obese and control groups for the par-

TABLE 3
*Obesity in the Index Child and in Members of His or Her Family**

	Obese		Non-Obese	
	Boys	Girls	Boys	Girls
Index (N)	17	20	14	14
Mean % overweight (SD)	147.5 (26.2)	138 (19.7)	101.6 (6.7)	91.7 (9.2)
Median % overweight	140	130	100	92
Range	120-193	120-194	90-118	76-108
Parents' view of index child as overweight (%)	13 (76)	16 (80)	0	0
Eyeball rating (%)				
Just right	1 (6)	0	14	14
Plump	7 (41)	2 (10)	0	0
Fat or very fat	9 (53)	18 (90)	0	0

Note: Obesity of obese boys vs. obesity of obese girls: $\chi^2 p < .05$.

Other Family Members (Eyeball Ratings)

Father (N)	14	16	14	10
Just right (%)	6 (43)	5 (31)	11 (79)	6 (60)
Plump (%)	4 (29)	6 (38)	2 (14)	3 (30)
Fat or very fat (%)	4 (29)	5 (31)	1 (7)	1 (10)

Note: Obesity of fathers of obese children vs. obesity of fathers of non-obese children: $\chi^2 p < .05$.

Mother (N)	17	20	14	12
Just right (%)	12 (70)	7 (35)	11 (79)	7 (58)
Plump (%)	3 (18)	6 (30)	3 (21)	1 (8)
Fat or very fat (%)	2 (12)	7 (35)	0	4 (33)
Other Siblings (N)	22	23	17	12
Just right (%)	16 (72)	17 (74)	17	11 (92)
Plump, fat, or very fat (%)	6 (28)	6 (26)	0	1 (8)

*Statistically significant findings are specified.

ents, particularly the mothers, to look more obese if the index child is a girl.

The pattern in the family of obese individuals showed differences according to the sex of the index child (see Table 4). For this analysis, only two-parent families were included. Obese girls had almost double the incidence of obese parents as compared to obese boys. A similar sex trend existed in the control group. Whereas over a third (36%) of the obese boys had no obese parents, all (100%) of the girls had at least one obese parent. The sex of the index child did not affect the incidence of obesity in the siblings. In 4 (25%) of the obese girls' families, all family members were judged obese; whereas this was true of only 1 (7%) of the obese boys' families.

In the families of obese boys, more fathers than mothers were judged obese. A similar proportion of fathers were obese in the girls' families and in the boys' families (69% and 57% respectively) with about half judged to be "fat" or "very fat" in both cases. Only 3 mothers in two-parent families of obese boys were judged to be obese (21%), and they were all given the rating of "plump." By contrast, 7 mothers of girls were obese (58%), all rated "fat" or "very fat." In the 3 one-parent families of obese boys where there was no father, 2 of the 3 mothers were judged "fat" or "very fat."

Emotional Health and Degree of Obesity

The sex of the child did not affect the emotional health of the family as a whole or the mental health of family members. The mean FHS score for the families of the obese boys and obese girls was 4.1 in each case (SD 0.8 and 1.0 respectively), and similar to the mean FHS score for control boys (4.0, SD 0.6). The families of the control girls showed a nonsignificant trend toward more health than the other groups (FHS: 4.6, SD 1.0). The Family Functioning Index (FFI self-report ratings) showed no differences between the families of the obese boys and obese girls. The mothers in both groups rated their families as more dysfunctional than did the mothers of the controls. In the general population, boys are recognized to have a greater incidence of disturbance, and this predisposition was found in the control group (boys: 54%; girls: 29%) but was absent in the obese group (boys: 41%; girls: 40%). There was a tendency for the father of obese boys to show less psychiatric disturbance than did the fathers of the obese girls.

In the initial analyses (15), associations between the degree of obesity of the index child and the assessments of both family functioning (objective: FHS; self-report: FFI) and the emotional health of individ-

TABLE 4
Patterns of Obesity in Two-Parent Families

	Obese		Non-Obese	
	Boys	Girls	Boys	Girls
Sample size (N)	14	16	14	9
No. of obese parents (%)	11 (39)	23 (72)	6 (21)	7 (39)
Families with (%):				
at least one parent obese	9 (64)	16 (100)	5 (36)	5 (56)
only mother obese	1 (7)	5 (31)	2 (14)	1 (11)
only father obese	6 (42)	4 (25)	2 (14)	2 (22)
an obese mother	3 (21)	12 (75)	3 (21)	3 (33)
an obese father	8 (57)	11 (69)	3 (21)	4 (44)
both parents obese	2 (14)	7 (44)	1 (7)	2 (22)
both parents and sibling obese	1 (7)	4 (25)	0	0

ual members (father: GHQ; mother: GHQ; index child: PR; sibling: PR) were looked for. The original findings were that the fatter the child, the better the mental health of the mother ($r = -.45, p < .05$), the better the mother assessed her family using the FFI ($r = +.37, p < .05$), and the more dysfunctional the objective rating of the family ($r = -.28, p < .05$). There was also a trend for obese index children and their siblings to show better mental health scores with greater obesity of the index child, and to be given a better assessment by the father. No association was found between the degree of the child's obesity and the father's mental health.

Further analyses according to the sex of the obese child suggested that the girls were mainly responsible for the above results. Thus, for the girls, the original significant association of fatness with family dysfunction was increased to $-.42 (p < .05)$, and the association with the mental health of the mother increased to $-.53 (p < .05)$. The other trends were strengthened: the trend toward better assessment of the family by the father with increasing obesity became similar to the trend for the mother, and the association of greater obesity with better mental health of the index girl and sibling also increased. All obese girls contributed to these correlations. The fattest girls made the major contribution in the case of the association of greater obesity with worse family functioning as objectively rated (less obese: $r = -.24$; more obese: $r = -.78, p < .001$).

In the subgroup of the less obese boys as in the group of obese girls, the fatter the boy the better the mental health of the mother ($r = .70, p < .05$), and a similar tendency for greater obesity to be associated with better mental health for the boy himself. In addition, there was a trend for the fathers' mental health to be better as the obesity increased ($r = -.50$). However, there was no association between the de-

gree of obesity and the FHS rating ($r = +.06$).

The more obese subgroup of boys presented a different picture. The correlation of degree of obesity with the mother's mental health was now absent ($r = -.17$), while the correlation with the father's mental health was strong and in the opposite direction ($r = +.91, p < .01$), that is, the fatter the boy, the more mentally disturbed the father. The sibling showed a similar association ($r = +.70, p < .05$), as did the index child himself ($r = +.61, p < .1$). The mother's assessment of the family also differed from that found in the girls, that is, the fatter the boy, the worse the mother assessed her family ($r = -.75, p < .05$). The father's assessment correlated $r = -.20$. The three most obese boys were marked out by having the only two fathers who were psychiatric "cases" on the GHQ; and in the third family in which there was no father, the mother was a "case" on the GHQ. The association between increasing obesity and improved family functioning as objectively rated was $r = +.17$.

Other Associations with Degree of Obesity

Except for a lesser degree of obesity in the school-obese subgroup, no other important associations with degree of obesity had been previously uncovered, for example, with family composition or social class, although earlier we mentioned the trend toward greater closeness to paternal grandparents in the more obese children. Further analyses were carried out to check for meaningful sex-differentiated associations with nil results.

Attitudes Toward Obesity and Eating

The Family Experience Interview in the home generated quantitative and qualitative assessments of the attitudes and experiences of families toward obesity and

related topics (17). The quantitative findings for families of obese boys and obese girls were compared, and on many of the items no sex differences were evident. Data on the quantitative items that suggest differences of possible importance are given in Table 5.

Most of the boys' families were actively trying to reduce the weight of their obese members, and all but one boy saw obesity as a problem. By contrast, in the girls' families, although the fathers and mothers usually saw obesity as a problem, in comparison with the boys' families they more

TABLE 5
Home Interview Assessment (HIA)—Quantitative Data on Obese Families

The numbers (Ns) in this part of the study are listed below. The Ns for each specific issue are also listed with the issue. This varies for a variety of reasons: for example, the numbers may be dependent on how a previous issue was assessed.

N's in Obese Boy Group		N's in Obese Girl Group	
Families	17	Families	19
Index child	17	Index child	19
Fathers	14	Fathers	15
Mothers	17	Mothers	19
1st Sibling	13	1st Sibling	12
2nd Sibling	6	2nd Sibling	6
HIA Issues		Boys' Families	Girls' Families
Obesity is a problem (%)			
Father (N = 13, 15)		10 (77)	11 (73)
Mother (N = 17, 19)		16 (94)	18 (95)
Index child (N = 13, 14)		12 (92)	11 (79)
Obesity is a good thing (%)			
Father (N = 14, 15)		3 (21)	7 (47)
Mother (N = 17, 18)		2 (12)	7 (28)
Index child (N = 15, 15)		4 (27)	3 (20)
Index child eats too much (%)			
Father (N = 12, 14)		7 (58)	10 (71)
Mother (N = 15, 17)		9 (60)	12 (71)
Index child (N = 13, 13)		6 (46)	9 (69)
Sibling (N = 8, 6)		4 (50)	6 (100)
Family trying to reduce overweight (N = 13, 14)		9 (69)	7 (50)
Preoccupation with food and eating (N = 17, 19)		7 (41)	12 (63)
Control of preoccupation (N = 5, 6)		5 (100)	3 (50)
Preoccupation is valued positively (N = 5, 11)		4 (80)	4 (36)
Control of eating (N = 14, 17)		12 (86)	3 (18)*
Holds stereotype of fat men (N = 10, 11)		0	3 (27)
Holds stereotype of fat women (N = 15, 15)		12 (80)	11 (73)
Obesity determines behavior of:			
nuclear family (N = 16, 19)		2 (13)	5 (26)
extended family (N = 11, 12)		5 (46)	3 (25)
school children (N = 17, 18)		14 (82)	12 (67)

* $\chi^2 p < .001$

frequently saw obesity as a good thing. Though members of the girls' families more often thought that the obese girl was eating too much for her needs, eating was often not under control ($p < .001$), and half the families were not actively trying to reduce overweight. In the girls' families, the preoccupation with food and eating was greater, less under control and usually negatively-toned. The boys' families saw obesity as more likely to determine the behavior of others outside the immediate family (school children, relatives); whereas the girls' families more often believed that obesity determined the behavior of immediate family members.

Notwithstanding the appearance of a more satisfactory family situation in families of obese boys and the positive tone to their preoccupations around obesity, the boys' families were judged to show significantly less openness ($p < .05$), and tended also to show less cooperation, less consistency, and less clarity during the home interview.

Qualitative analyses in the Home Interview Assessment also revealed sex differences that are elaborations of the above findings. In families of obese boys, issues related to obesity, eating, and food were often not perceived as the most important problems facing the family. Mothers often appeared to be overinvolved with a sibling, or the parents saw another sibling as the main cause for concern. However, the parents did show concern for the boy and his obesity. By contrast, in girls' families, the parents appeared to be antagonistic toward the obese girl, interacting negatively with her on account of the obesity. The girl seemed to be blamed for her obesity. Family comments about food, eating, or dieting were marked by ambivalence, and the parents tended to be fighting with the obese girl over food. There were sharp criticisms by family members about timing of meals

or about the food served. It was also noticed in the families of the obese girls that one or both parents were often more concerned about their own weight, and looked to the doctor to be concerned about them rather than about the obese child. The parents also used the doctor more for authority, supervision, and a "tablet cure" than was the case with parents of the obese boys.

Characteristic Family Interaction

The number of cases available from the videotape analysis of family interaction is small: 7 boys' families; 5 girls' families. The videotape analysis was concerned to test for differences between obese and control families, and was not oriented toward determining sex differences. One finding, however, emerged—a trend for families of the obese girls to show more marital hostility than families of obese boys (80% vs. 14%; $p = .11$). A further, more detailed study of the family interaction on the videotapes is being undertaken. Preliminary analyses suggest that similarities in family behavior and member responsiveness overshadow differences. These differences are mainly associated with greater hostility in families of obese girls in relation to the obese girl (Loader, personal communication).

DISCUSSION

The data from our study of obese children and their families have revealed several previously unreported differences according to whether the index child is a boy or girl, and shown that degree of obesity is significant for any analysis of psychosocial factors. Overall confidence in the findings must be tempered by limitations in the design of the study, the sample used, the controls chosen, the methods employed, the large number of variables examined, and the measures taken. The combination of coeliac and normal children

to form control groups, and the combination of the various obese subgroups is also potentially problematic. Because all of these factors have been analyzed and examined in detail in previous articles and are not inherently invalidating, discussion here is restricted to their possible effect on the differences discovered.

The most important limitation, as emphasized in the introduction, is that the research was not specifically designed to uncover or explain sex differences. But this was because *the literature had not warned us to expect them*. To explain the findings would be to speculate, whereas our concern is to generate a focus on *sex differences as a fact*. This article should therefore be taken as a stimulus to replication and further investigation.

We shall now review the findings and place them in the context of other studies and possible future research. The main new findings concern the presence of obese individuals within the family, the effect of the degree of overweight on family emotional health, the role of the father, and attitudes and experiences within the family. The sex differences found could not be explained by demographic variables, differences in family composition or structure, sampling of different obese populations, or differences on emotional health measures.

Presence of Obese Individuals Within the Family

In regard to the obesity itself, although the boys were more overweight (that is, weight adjusted for height and sex) than the girls, they looked less obese. This difference might be due to cultural attitudes toward obesity held by the raters who were not rating blind, to the kind of clothing worn by the children, to differences in the distribution of the excess fat, or to greater muscle mass in boys. Another possibility is that the "Cole slide rule" (8) used for the calculations might have an built-in bias.

Discrepancy between actual weight and the appearance of obesity might be held to invalidate the findings with respect to obese members. However, it was inappropriate to the aims and procedures of the study to weigh other members of the family. We explained the purpose of the studies mainly in terms of our interest in family life, and the families did not know we were studying obesity (although the hospital obese families probably assumed this). In addition, the whole research approach meant that the appearance of fatness, which is the root of social response, had to take priority over objective weight.

Girls had more obese members in their families, and always had at least one obese parent, and often two. In particular, more of the mothers of the obese girls looked fat than did the mothers of the obese boys; and siblings showed a similar trend. Obese mothers and obese fathers figured equally often in the families of the obese girls. The families of the obese boys showed a different pattern: they were distinguished by the absence of any parental obesity in one-third of cases, and the relative frequency of obese fathers in the remainder. Obesity of mothers and siblings when present was mild. When there was no father in a boy's family, the mother tended to be obese. Bias of the raters is a possibility, but why raters should have a bias based on the sex of the index child and produce such a complex pattern is not clear.

The existence of increased obesity in parents of obese children is established (27), but the family patterning of the obesity in relation to the sex of the obese child has been less studied (9). Our small study generated two family findings on sex-differences, which agree with the findings of the large Ten-State Nutrition (TSN) Survey, although the sex difference was not emphasized in the reports of that survey (9). We found that a family in which only the mother is obese tends to produce obese

girls only, whereas a family in which only the father is obese produces obese girls and obese boys. The TSN Survey committee was surprised to find that obesity in the father had a greater influence on overall level of fatness in the children and on the spread of fatness among children of both sexes than did obesity in the mother. Our findings also suggest that the presence of an obese parent may play an important role in the etiology of obesity in girls, whereas parental obesity may be less important for boys. This proposition is also supported by the TSN Survey, which showed that the combination of lean fathers and lean mothers, though least often producing obese children, was associated with the greatest boy-girl disparity (boy > girl) in weight.

Degree of Overweight

Analyses have clarified that correlations between the degree of overweight and family health (15) are determined by the sex of the index child. In the case of girls, the more overweight, the better the mental health of the mother, and probably the better the mental health of the sibling and the index child; but there is no association with the father's mental health. A greater degree of obesity in the girls was also associated with the fathers and mothers tending to rate their family as functioning well. However, as rated by outsiders, the more obese the girl, the more dysfunctional the family—an association most evident when the obesity was most severe. We have speculated that obesity in girls functions as an effective regulator of family tension (12).

The picture for the obese boys is more complex. The findings for obese girls apply to the "less obese" boys (standardized weight 120%–140%), except for the absence of any association with the objective assessment of family functioning and a possible association between greater obesity and better mental health of the father.

Perhaps these boys too can act as a regulator of family tension.

However, if this notion of how families work is correct, the "more obese" boys (standardized weight 140%–196%) seem to fail in this role because they show a contrasting set of associations. The increasing obesity is generally associated with increasing disturbance: the fatter the boy, the sicker the father, the sicker the sibling, the sicker the index child, and the worse the mother and father assess the family. However, greater obesity may still be weakly associated with better mother's mental health on self-report, and weakly associated with better family functioning as rated by outsiders.

Role of the Father

Previous research and popular myth have both minimized or ignored the possible role of the father in obesity (compare 5, 20, 33), or been surprised by it (9), although a recent adoption study suggested that the father's role might be important (24). In the Discussion so far, we have pointed out the significance of an obese father in the family, and have indicated that the degree of obesity of the obese child may be associated directly or inversely with his mental health. A further family finding is the greater degree of closeness to the *paternal* grandparents, but not to *maternal* grandparents, as measured by geographical proximity and frequency of contact. This was most noted in the obese boys, especially the more obese boys. A greater frequency of contact was also noted in the families of the more obese girls in comparison to the families of the less obese girls.

Family Attitudes, Experiences and Interaction

The quantitative and qualitative data from the Home Interview Assessment raised a number of paradoxes. The boys' families had a more positive and less intense

orientation toward obesity than did the families of the obese girls. There was a more positive concern for the boy himself and for his condition; and some attempt at management existed. However, the picture is marred by the persistence of obesity, and by the difficulty experienced by the interviewers in their handling of the families.

In the girls' families, by contrast, hostility, ambivalence, and paradox were overt. Obesity was both a problem and a good thing. The girl was blamed for her obesity, but eating in the family as a whole was out of control. The parents criticized the girl for her obesity but were not actively trying to reduce her weight. There was much mutual criticism around issues of food and meals. The findings in the families of obese girls are congruent with the view that obesity in women is associated with social hostility and self-directed hostility (33). They are compatible with the finding from our direct observation that marital hostility was more evident in the girls' families (18).

CONCLUSION

There are many studies of childhood obesity that investigate anthropometric, biochemical, physiological, psychological, and epidemiological factors. However, surprisingly in view of the many differences between boys and girls in these various spheres, only few studies (apart from social-class analyses) have concentrated on sex differences. None of these take the family system viewpoint. Kalucy's (11) substantial review of obesity does not provide a focus on sex differences; and Bruch's (5) extensive clinical investigations are written with the assumption that obesity is essentially similar in men and women. More recent reviews do not indicate a significant change in this viewpoint (2, 4). Studies of stigma and the cultural meaning of obesity (1, 20, 33) do stress the different meaning that obesity has for the male and female, but have minimized the

role of the father and the meaning of obesity for boys. Our study too was not designed to reveal differences between the boys' and girls' families, but they emerged too prominently to be ignored. In discussion, pediatric colleagues have confirmed that our findings echo clinical experiences not previously articulated.

It seems likely that the sex differences came to light because obesity was studied at the level of the family. Hereditary and simple habit factors may contribute to childhood obesity in certain ways, but such findings and those in our earlier articles suggest that they may be secondary or subsidiary to cultural and family relationship variables; or, if primary, they provide only a potential for obesity. As the present project has demonstrated, the systematic study of family system variables is possible and promises a deeper appreciation of obesity as it actually affects children. The findings here are congruent with the theory proposed in our earlier articles (15, 17, 18), which suggested that childhood obesity might be regarded as a disturbance involving the individual's self-image and identity. Given that boys and girls feel different as individuals and take up differing roles within the family and in society, such a disturbance in identity would be expected to manifest differently in the two sexes. It would also be expected that father and mother would play significant but different parts in its genesis. Irrespective of the correctness of this theory, the empirical findings of sex differences deserve replication and pose important questions about the nature of obesity and its relation to family and social life.

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