*PARENTAL INFLUENCES ON CHILDREN'S EATING
BEHAVIOR AND RELATIVE WEIGHT*

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We investigated the relationship between selected parent behaviors, child mealtime behavior, and infant relative weight. Subjects were 7 male and 7 female children varying in age from 12 to 30 months (mean = 23.9 months). Each subject and parents were observed during the dinnertime meal on two occasions using the BATMAN (Bob and Tom's Method of Assessing Nutrition). The children spent 58% of the mealtime eating. They spent very little time making active decisions about what and how much they ate (food requests = 2% of the time; food refusals = 1% of the time). We found significant correlations between child relative weight and (a) parental prompts to eat ($r = .81$, $p < .001$), (b) parental food offers ($r = .51$, $p < .05$), and (c) parental encouragement to eat ($r = .82$, $p < .001$). Thus, the present study suggests a relationship between certain parental variables and the relative weight of their children.

DESCRIPTORS: obesity, eating, parental influence, children

In the past few years, there has been increased interest in carefully assessing the food intake of young children because the levels and types of food intake are a possible factor in the onset or maintenance of obesity (e.g., Brownell, 1982). There has been a particular focus on the use of specific, microanalytic, and observational approaches of food intake to document the often subtle differences between normal weight and overweight children. For example, Drabman, Hammer, and Jarvie (1977) report that overweight children take more bites per unit of time and fewer chews per bite than normal weight

children. These differences occur as early as 1½-2 years of age, and hold for students up to 7-13 years of age as well (Drabman, Cordua, Hammer, Jarvie, & Horton, 1979; Marston, Landon, & Cooper, 1976). Marston et al. (1976) also reported that normal weight 6- to 14-year-old children left more on their plates than overweight children of the same age.

A parallel set of research has begun to implicate the importance of selected parental variables that may serve to modify selectively the food intake of young children. Waxman and Stunkard (1980) provide some intriguing preliminary data in which they directly observed four overweight boys and compared them to their normal weight brothers. Results indicated that the obese boys consumed significantly more calories and ate faster (at lunch and dinner) than their brothers. However, the mother served the obese son far larger portions than she did his nonobese brother, and served food more often as well. When queried as to the differential

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food serving, the mothers uniformly replied, "He's a bigger boy so he needs more food" (Waxman & Stunkard, 1980, p. 192).

Although several laboratory reports have documented significant relationships between mother-child interactions and somatic growth (Crow, Fawcett, & Wright, 1980; Pollitt, Gilmore, & Valcarcel, 1978; Pollitt & Wirtz, 1981; Wright, Fawcett, & Crow, 1980), the Waxman and Stunkard (1980) study is the first that suggests the direct and differential effect that parents may exert on both their normal weight and overweight children in the natural environment. The current study sought to extend these findings by systematically and directly assessing children's food intake and specific parent-child interactions that may be selectively encouraging, discouraging, and modifying selected mealtime behaviors. Reliably quantifying both children's mealtime behaviors and parent-child interactions may begin to provide the foundation for the needed documentation of the relative importance of selected parent behaviors on feeding and the relationship between these behaviors and child relative weight.

PROCEDURE

Instruments

The BATMAN (Bob and Tom's Method of Assessing Nutrition) was designed to record child behaviors at mealtime and related physical and social environmental variables. The BATMAN is an observational assessment, based on pilot testing of children's eating and parent-child interactions, designed to assess child eating behavior and parent behavior which occurs simultaneously with child behaviors. Table 1 presents the rating dimensions and specific categories under each dimension and Table 2 presents the operational definitions of each of these categories.

The BATMAN uses a partial interval time-sampling system (Cone & Foster, 1982) to record behavior; children and parents are observed for 10 sec, followed by a 10-sec recording

period. During the recording session, the observers first code all of the child's behavior during the 10-sec time period on coding sheets (i.e., 1 = eating, 4 = talking). If another person was interacting with the child in terms of encouraging, discouraging, prompting, or modeling child food intake, this interaction was recorded along with the child's response to the prompt. For example, if the mother told her child to "eat your potatoes" and the child complied, the following would be coded on response sheets: under who interacted, "mother" (1); and, under the behavior in the child that is being encouraged/discouraged "verbal encouragement" (3) to "bite, suck, place food in mouth" (1). Thus, the BATMAN allows for an assessment of child eating behavior, and is flexible to code parent-child interactions that may be related to children's eating behavior. Some studies (e.g., Drabman *et al.*, 1977) have attempted to quantify certain topographical aspects of normal weight and overweight children (e.g., bites per unit time). The current assessment is primarily interested in certain parental variables that may modify children's eating behavior. Thus, topography of food intake is not directly assessed with the BATMAN.

Observer Calibration and Training

All observations were conducted by four psychology students. Observers learned operational definitions and general procedures for recording data and role played interactions to demonstrate each behavior. Observers practiced until they reached .90 interrater correlation (using a weighted Kappa). Live in-home observations of nonstudy families followed until they achieved or exceeded .90. At the end of this training period, interrater reliability (agreements divided by agreements plus disagreements; computed using a frame-by-frame correspondence) was 94% (.92 Kappa) for the interactional categories and 96% (.93 Kappa) for child behavior categories.

Throughout the study, weekly one-hour training sessions were conducted to provide feedback

Table 1
Bob and Tom's Method of Assessing Nutrition (BATMAN) Response Categories

1. After every 10-sec observation period the following are always coded:			
<i>Child's environment</i>		<i>Child's behavior</i>	
1) Bedroom		1) Bites, sucks, places food in mouth	5) Away from table
2) Living Room		2) Playing with food, utensils, or nonfood items	6) Engaged in other activity
3) Kitchen		3) Crying	7) Food requests
4) Bathroom		4) Talking/Babbling/Whining	8) Refusing food
5) Dining Room			9) Spitting up
6) Activity Room/Basement			
2. If during a 10-sec observation someone encourages or discourages child activity, the following are coded:			
<i>Who interacted</i>	<i>Child behavior that is being encouraged/discouraged</i>		<i>Child's response to interaction</i>
1) Mother	1) Physical encouragement	1) Bites, sucks, places food in mouth	1) Bites, sucks, places food in mouth
2) Father	2) Physical encouragement	2) Playing with food, utensils, or nonfood items	2) Playing with food, utensils, or nonfood items
3) Sister	3) Verbal encouragement	3) Crying	3) Crying
4) Brother	4) Verbal discouragement	4) Talking/Babbling/Whining	4) Talking/Babbling/Whining
5) Grandmother	5) Presents food	5) Away from table	5) Away from table
6) Grandfather	6) Offers food	6) Engage in other activity	6) Engage in other activity
7) Other relative	7) Modeling eating	7) Food requests	7) Food requests
8) Babysitter/Caretaker		8) Refusing food	8) Refusing food
		9) Spitting up	9) Spitting up

to observers on their interobserver agreement coefficients. Role plays were coded independently by all observers and their ratings were compared to a criterion rating to ensure maximum accuracy and to guard against observer drift (Cone & Foster, 1982). Any observer failing to achieve a .90 agreement coefficient was retrained until he or she reached this .90 level.

Subjects

Fourteen children (7 male, 7 female) ranging in age from 12 to 36 months (mean = 23.9, $SD = 8.9$) were recruited for participation in this study from the Pediatrics Clinic of a participating comprehensive health care clinic in Fargo, North Dakota. Ninety-one percent of all participants initially contacted agreed to be observed for a maximum of 3 hours and signed consent forms stipulating their concurrence. The range of weights was 21.00 to 33.50 pounds (mean =

25.43, $SD = 3.41$) and the range of heights ranged from 28.25 to 36.00 inches (mean = 31.54, $SD = 2.12$). Relative weights ranged from the 49th to 99th percentile (mean = 66th percentile, $SD = 16.53$) according to the National Center of Health Statistics (NCHS) growth curves (DHEW, 1977). All the children were Caucasian, middle-class, and from two-parent families who were always home during the observations. Most of the children (56%) had other brothers or sisters (mean = .9, $SD = 1.01$).

Procedures

All observations were conducted on a "typical evening" (as determined by the parents) in each child's home during the dinner hour. Two observers arrived at the home prior to dinner and obtained informed consent. After a 20-min adaptation period, both observers independently ob-

Table 2

Operational Definitions of BATMAN Categories

PARENT BEHAVIOR

1. *Physical encouragement*
Pats, hugs, kisses, pushes or moves, directs physically, holds and points, models
2. *Physical discouragement*
Hits, restrains from action, removes child or object, redirects or moves in another direction, pushes, spansks
3. *Verbal encouragement*
Suggests, command, directs, makes positive statements about
4. *Verbal discouragement*
Forbids, scolds, refuses, makes negative statements about, yells
5. *Presents food*
Feeds, places food in child's direction without physically encouraging food intake
6. *Offers food*
A verbal food offer; e.g., "Do you want more food?" This differs from verbal encouragements in that a desired behavior is not explicit (e.g., "Eat more food.")
7. *Modeling eating*
Parent demonstrates desired eating behavior and tells child to eat like himself or herself

CHILD BEHAVIOR

1. *Bites, sucks, or places food in mouth*
Child sucks milk from bottle or breast, bites or chews on object, places food in mouth or solid food is placed in mouth by parent
2. *Playing with food, utensils, or nonfood items*
Child messes, stirs, throws, crumbles, or otherwise treats food as a toy; child plays with toy, utensil, person, clothes, or parts of body
3. *Crying*
Audible crying; not scored when cry is for a specific food object
4. *Talking, babbling, whining*
Child babbles, talks or whines to self, sibling, parent or other; not scored if vocalizations are for food
5. *Away from table*
Child gets up from table or is taken away from table by parent, sibling, or other person
6. *Engaged in other activity*
Child is at table, but is sitting quietly, staring, and not otherwise engaged in any behavior rated as 1 to 9
7. *Food requests*
Child points to food so as to request it, asks for food, begins to whine or cry for food
8. *Refusing food*
Child closes mouth, turns head away, pushes food away when presented by parent, sibling, or other person
9. *Spitting up*
Childs spits up or vomits

served the evening meal. The observers were warned and trained in techniques for avoiding interactions with the family and in methods for ignoring and discouraging interactions with the children. They attempted to situate themselves away from the center of family activity and away from the dinner table in order to observe and yet not participate in dinner or in any other activity that was occurring. After the meal, the child's height and weight were independently obtained with a balance-beam scale (accurate to $\frac{1}{4}$ inch and $\frac{1}{8}$ pound).

Two undergraduate psychology students, blind to the child's relative weight, independently scored the two observers' assessments. Interobserver agreement and Kappa coefficients (Ciminero, Calhoun, & Adams, 1977; Fleiss, Cohen, & Everett, 1969) were then independently calculated by the senior author and an undergraduate in psychology.

Approximately one month (mean = 33 days, $SD = 6.2$, range 23-43) after the initial observation, all families were recontacted and asked to participate in a repeat observation. All 14 families agreed to participate in the retest. Children were all observed following the same procedures as outlined above. Retest heights and weights were not taken, however, and given the very high degree of interobserver reliability (see below), a single observer coded the retest. The strict training and calibration procedures, as described above, continued throughout this phase of the data collection process.

RESULTS

Preliminary Analyses

Preliminary analyses revealed that all prompts to eat were parental prompts. Maternal prompts ($n = 148$) occurred at a higher rate than paternal prompts ($n = 100$). However, paternal and maternal prompts did not interact with any of the experimental variables; as a result these data were pooled. Although verbal encouragements to eat occurred at a much higher rate (87%; $n = 69$) than physical encouragements

(13%, $n = 10$) to eat, no other differences were observed and all encouragements to eat were pooled as "encouragements to eat."

We observed no verbal or physical discouragements to eat. Similarly, in this sample, parents never actively modeled eating (as defined in Table 2). Hence, these parental prompts cannot be analyzed further.

Reliability of Observations

The results of frame-by-frame ratings of inter-observer agreements (agreements divided by agreements plus disagreements) revealed that both observation teams achieved high levels of agreement. Interobserver agreement averaged 92% for parent behavior and 96% for child behavior, for an overall average of 95%. Weighted Kappa coefficients (Ciminero et al., 1977) ranged from .88 to .94 (mean = .91). Neither observation team significantly differed in the reliability of their observations.

The results of the one-month retest revealed temporal stability in both children's and adults' behavior. Test-retest correlations ranged from .61 to .94 (mean $r = .84$) for child and adult mealtime behaviors. Paired t -tests revealed no significant differences between the first and second observation in children's behavior and only one significant difference in parents' behavior. During the second observation, parents gave significantly more food presentations, $t(26) = 2.45$, $p < .05$, than during the first observation.

Analysis of Parent and Child Behavior and Their Interrelationships

Given the very high one-month temporal stability of parent and child behavior, the two observations were combined to yield a single index of behaviors for each child. Table 3 presents the means, standard deviations, and percentage of time intervals spent by children in each of the eight behaviors.

Children spent a majority of the total meal time eating (58%). They were "engaged in other activities" 16% of the time, followed by playing (10%), and talking (10%). Children spent very

Table 3

Means, standard deviation, and percentage of time intervals spent in each child behavior.

	Mean	S.D.	Percentage of total time
Eating	81.3	21.5	58%
Playing with food or other items	14.5	16.9	10%
Crying	0.1	0.3	0%
Talking	14.5	13.4	10%
Away from the table	2.1	2.4	2%
Engaged in other activity	22.7	12.1	16%
Food requests	2.2	1.9	2%
Food refusals	2.0	2.7	1%
Total time (observations)	139.4	37.3	—

little time requesting (2%) or refusing (1%) food.

Table 4 presents the correlations between parental prompts, meal length, and relative weight. We found strong significant correlations between parental prompts to eat and child relative weight. Parental offers of food (e.g., "Do you want more food?"), parental encouragements to eat (e.g., "Eat more meat") and total food prompts (i.e., presenting + offering + encouraging) were correlated with child relative weight ($r = .81$, $p < .001$). The length of the meal did not significantly correlate with relative weight, but total time spent eating did correlate ($r = .59$, $p < .05$) to relative weight.

Given the small sample size, it is possible that one or two extreme cases could bias the correlations between the major variables in one direction or another. As a result, the sample was dichotomized into those children at or below the 75th percentile in weight (i.e., normal weight, $n = 10$) and those exceeding the 75th percentile in weight (i.e., overweight, $n = 4$). The means and standard deviations of parental encouragements to eat, food presentations, and offers of food are presented in Table 5.

Inspection of Table 5 indicates that parents of overweight children gave significantly more encouragements to eat, $t(12) = 2.51$, $p < .05$,

Table 4
Intercorrelations Between Meal Length, Parental Prompts, and Child Relative Weight

	<i>Total Meal Length</i>	<i>Total Eating Time</i>	<i>Total Parental Encourage- ments To Eat</i>	<i>Total Parental Presents Food</i>	<i>Total Parental Offers Food</i>	<i>Total Parental Food Prompts</i>
Child Relative Weight	.37	.59*	.82***	.33	.51*	.81***
Total Meal Length		.80***	.05	.79***	.28	.52*
Total Eating Time			.25	.48*	.55*	.66**
Total Parental Encouragements To Eat				-.01	.34	.60**
Total Parental Presents Food					-.03	.70**
Total Parental Offers Food						.44*

Note. $N = 14$

* $p < .05$

** $p < .01$

*** $p < .001$

Table 5

Means and standard deviations of parental encouragements to eat, food presentations, offers of food, and total food prompts by weight class.

	<i>Normal Weight ($n = 10$)</i>	<i>Overweight ($n = 4$)</i>
Encouragements to Eat		
Mean	3.50	15.75*
S.D.	2.61	8.32
Food Presentations		
Mean	10.90	20.25
S.D.	12.45	12.57
Offers of Food		
Mean	3.00	7.00*
S.D.	3.92	1.66
Total Food Prompts		
Mean	18.20	41.75*
S.D.	9.50	14.60

* $p < .05$

more offers of food, $t(12) = 2.45$, $p < .05$, and more total food prompts, $t(12) = 2.61$, $p < .05$, than the parents of normal weight children. Although the means were in a similar direction, the two groups did not differ with respect to food presentations, $t(12) = 1.11$, n.s., as variability in both groups was very high.

The effects of sex and age of the child on the major variables revealed only two significant findings across all comparisons. Age of the child significantly correlated to the number of parental food offers, $r = .46$, $p < .05$, and males tended to receive more food presentations, $t(12) = 2.41$, $p < .05$, than females.

The relationship between parental prompts and child eating and relative weight is corroborated by an analysis of discrete eating patterns. The probability of a child eating given an en-

couragement to eat was .76 (60 of 79). Similarly, the probability of a child eating if given a food offer was .77 (23 of 30) and if presented with food, the probability of a child eating was .79 (110 of 139). In fact, 23% (258 of 1,135) of all child eating occasions were preceded by a parental prompt to eat. In contrast, the probability of a child eating if *not* given a prompt to eat (i.e., the base rate of eating during the mealtime) was .51.

The impact of the parents is illustrated by what occurred if a child either refused or requested food. If a child refused food (total observations = 40), 88% ($n = 35$) of the time the subsequent behavior was a parental prompt to eat and a .70 probability (28 of 40) that the child would subsequently eat. In contrast, if a child requested food (total observation = 45), only 44% ($n = 20$) of the time was the subsequent behavior either a parental prompt to eat ($n = 8$) or eating ($n = 12$) by the child. One would expect a parental prompt to eat if the parents were responding to the child's food prompt. As Table 2 indicates, food presentations are defined as placing food in the physical proximity of the child. As a result, if parents were actively responding to the food requests, they should be giving the child more food (i.e., food presentations). In this sample, this was apparently not the case. This seems to suggest that food requests by the child are not as actively responded to by parents as are food refusals by the child.

DISCUSSION

The results suggest that the BATMAN observational assessment is reliable across observers and occasions. Further, the data are consistent with other findings (e.g., Waxman & Stunkard, 1980) that may suggest that parents have a significant influence on the eating (and perhaps relative weight) of young children. Parental prompts, particularly parental encouragements to eat, highly correlated to child relative weight and increased the probability that a child would

eat. In contrast, it appeared that children in this sampled age group do not have much control (or perhaps much interest) in the evening meal, as food requests and refusals occurred at a very low rate. A child food refusal usually led to a parental prompt to eat more food, and a food request by the child was not likely to elicit either a parental prompt to eat or subsequent eating in the child. Future studies should assess both younger and older children in a longitudinal fashion and should assess the types of foods (e.g., carbohydrates, protein) that are being encouraged.

The results of this study should be viewed with some caution. Although each child was intensively and directly studied, the sample size was small. Further, the ages of the children, socioeconomic status, and ethnic backgrounds were restricted, further limiting the generalizability of the study. Additionally, although we were careful to match our participants along a number of parameters, several factors (e.g., family size, number of siblings, sampling error, possible reactivity effects, developmental changes) may have affected the results. Future studies should systematically assess these potential moderator variables.

The finding that food presentations were not significantly correlated to relative weight, whereas food offers were moderately correlated and encouragements to eat were strongly correlated could be related to the level of persuasiveness of the food prompt. Presenting food merely places food in the physical proximity of the child and there is, by definition, no active encouragement taking place. A food offer (e.g., "Do you want more soup?") is a moderately persuasive message, whereas an encouragement to eat (e.g., "Eat your soup") is a direct, unequivocal attempt at prompting eating in the child. Perhaps the persuasive intensity of a food prompt is a better predictor of child relative weight than the presence or absence of food prompts.

The results of the present study may also have important implications for the treatment of

obesity in children. Although early intervention of obesity is seen as highly controversial (Blackburn, 1974; Pisacano, Lichter, Ritter, & Siegal, 1978), because childhood obesity tracks so strongly (e.g., Charney, Goodman, McBride, Lyon, & Pratt, 1978), early intervention and prevention strategies for obesity must evolve (Coates & Thoreson, 1980). However, definitive data on the correlates of obesity in children are lacking (Myres & Young, 1979); hence, treatment strategies based on informed empirical data cannot be implemented. The present study may implicate the role of parental variables as correlates to child relative weight. It is interesting to note that the three children at the national mean (49th, 50th, and 52nd percentile) of weight controlled for height and sex (DHEW, 1977) received *no* encouragements to eat or food offers during either feeding session. In contrast, the two children at the 99th percentile received an average of 30 and 36 encouragements to eat or offers of food during each feeding session. It is clear that future studies should focus on parental influences on children's energy balance behaviors.

In sum, much work lies ahead in determining the various environmental influences on obesity in children. However, if the outcome of such research results in a more lucid understanding of the psychosocial correlates of obesity in children, efforts expended will be worthwhile.

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